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Reduction Vat Dyes, and Their Use

Indigo, the First Reduction Vat Color—Conversion to "Indigo White"—Preparation of Dye Baths—General Handling of Vat Colors—Comparative Fastness Properties

By WALTER E. HADLEY

AT the beginning of the World War, the supply of dyestuffs, which had been constantly coming from Europe, suddenly stopped and the manufacturers of the world, for the first time, realized their utter dependence upon the importation of German dyes for the success of their dyeing industries.

By intensive work, and concentration, it was quite easily possible for the chemists of America to bring forth certain of the simpler dyestuffs, and this was quickly done. There was, however, a class of dyestuffs, known as the reduction vat colors, the manufacture of which required a high type of chemical knowledge and extensive research, and it was some time before these could be produced in paying quantities; but at the present time there are several of the vat colors manufactured in the United States which are fully equal in every respect to the pre-war colors of this type. The line, however, at the present time, is not complete, and much yet remains to be done before a full line of American vat dyes will be available.

The First Reduction Vat Color

The first dyestuff of this class, and one which had been in use for centuries, was Indigo.

Natural Indigo is the product of a plant known botanically as "Indigofera Tinctoria." Up to the year 1897 the world's supply of Indigo was wholly dependent upon the natural product, but during that year an artificial Indigo was introduced which possessed far greater purity than the natural product, and vast quantities of this dyestuff were sold.

A very fine grade of Indigo is now manufactured in this country and finds a ready market.

Indigo possesses a blue color, with a decided coppery hue, and is insoluble in water. By treatment with the proper chemicals, it can be easily converted into a soluble condition and so controlled that it can be readily applied to any type of fiber.

Conversion to "Indigo White"

While "Indigo Blue" is insoluble in water, it can be converted into the so-called "Indigo White" by treatment with certain reducing compounds, this latter compound being very soluble.

Many different schemes have been employed in the past, for the production of "Indigo White," notable among which may be mentioned the following: woad vat; soda or german vat; potash vat; urine vat; hydrosulphite vat; copperas vat; and the zinc vat. All of the above vats are dependent upon the production of nascent hydrogen for the reduction of insoluble "Indigo Blue" to soluble "Indigo White."

The dyeing of the material is brought about by immersing it in the properly reduced "Indigo White" solution, and after a thorough impregnation the material is evenly squeezed and hung up where it can be exposed to the oxygen of the air. When the goods are first removed from the dye bath, they possess a lemon-yellow color, but this quickly changes to a rich and beautiful blue, due to oxidation.

Preparation of Dye Baths for Reduction Vat Colors

The reduction vat dyestuffs, in general, require the following ingredients in the preparation of the dye bath:

The required dyestuff.

Monopole Oil, or similar product, to aid in the formation of a smooth paste.

Caustic soda to aid in the solution of the dyestuff.

Sodium hydrosulphite (powder) to bring about the reduction of the dyestuff.

Common salt or Glauber's salt is often added to the dye bath to produce better exhaustion of color.

The amount of caustic soda and sodium hydrosulphite

is wholly dependent upon the particular dyestuff being processed, and the correct amount must be determined by experiment. The temperature required in dissolving and reducing the color also varies to a considerable extent.

A great many dyeings produced with vat dyestuffs require a thorough treatment in a boiling soap solution to brighten the shade, and to remove the excess of oxidized color.

General Treatment

Certain dyestuffs of the Indigoid Series, when reduced, assume an entirely different color than the original dyestuff, many possessing a pale yellow color. Those dyestuffs derived from anthraquinone, when reduced, are practically the same color as the original dyestuff.

In bringing many of the vat dyes into solution, it is essential that an excess of caustic soda be used, and this must of necessity be thoroughly removed following the dyeing operation. It is often considered desirable to give a treatment in a weak sulphuric acid bath in order to remove the last traces of alkali from the dyed material.

The vat dyes, in general, are noted for their extreme fastness to the ordinary color-destroying agencies, although there are certain well-known instances wherein several of the vat dyestuffs fail to give the required fastness.

The vat dyes derived from anthraquinone possess extraordinary fastness. The sulphide dyestuffs possess very good fastness, while the Indigoid dyestuffs possess the poorest fastness of the series.

The vat dyestuffs are particularly well adapted for the dyeing of cotton material where fastness to water, soap, alkali, acid, and chlorine is required.

The vat dyestuffs find wide usefulness in the production of colored effects in white material. This class of fabric often requires that the white portion be bleached following the dyeing treatment, and the fastness of the vat dye in this particular makes it very desirable.

In textile printing, the use of vat dyestuffs gives a material which possesses great fastness, and is especially valuable in the production of certain types of white goods containing one or more colors.

In dyeing the woolen material with the vat colors, care must be taken that the alkalinity is kept as low as possible.

The Microscope: An Important Industrial Instrument in Analysis, Testing and Manufacture

Part IV, Conclusion

(*Concluded from page 282.*)

By A. K. JOHNSON, S.B.
Lowell Textile School

Studying with the Microscope—General Plan of Procedure—Measuring Microscopic Objects—Varying Angle of Light to Bring Out Special Characteristics—Physical and Chemical Treatment of Object—Interpretation of What Is Seen

Studying with the Microscope

1—General Plan of Procedure

WHEN satisfactory conditions of cleanliness, of lighting and of mounting of the material to be examined have been provided, the task of making the real study is begun. The actual method of procedure naturally depends upon the object and the purpose of the study. It is advisable, as a general rule, to have at hand as much information as may be obtained as to its source, what it is used for, what treatments it has been given, etc. As much further information is secured from careful examination in bulk, and from as many sides as can be done by visual inspection, so that an idea of the material as a whole may be had. In the absence of authentic records or absolute standards for judgment as to the serviceability or quality, etc., of a given material, much use is made of comparisons of the submitted samples with other samples of known satisfactory nature. One often finds good help in expressing results relatively to these standards. One of the first steps for an Industrial Microscopist to take, therefore, is the securing of representative samples of his materials which may serve as future guides and standards. These standards will, of course, be safeguarded to the limit against undue contamination, mix-up and deterioration. In making the actual comparison under the microscope every effort is made to have all conditions for examination the same in standards and submitted sample.

The problem of what powers of magnification to work with also varies with the object. The larger the object the lower the initial magnification employed may be. It is usually helpful to begin with the lowest power which will show anything of value, and then to work up consecutively to the highest powers neces-

sary to give the desired information. By the use of the lowest power first a broader view of the object is obtained. This attracts the attention to the grosser detail and gives a better idea of the relationship of one part to another. After the study with the lower power is completed it is pushed to a next higher serviceable magnification and the detail of secondary gross character observed. Figs. XV and XVI show the effects of higher magnification. Continuing in this fashion gives correlated information of details which are successively fine in nature. The system put into the study and the correlation of the successive bits of information are valuable features of the plan.

The preliminary use of lower powers has a further advantage of helping to locate more rapidly some particular spot which may be worthy of study. Such spots are easily located with lower powers and can then be placed in the very center of the field. The higher power objective can then be swung in and the study of this area carried on. In no case is it considered advisable to use a higher power of magnification than the problem demands.

An application of this method of study can be easily seen in considering a union fabric made from fine counts yarn and containing a woven pattern. The extent and repeats of the pattern and the style of weave may be studied with a low power magnifier. By picking out and studying each thread in the pattern, with a higher power if necessary, the ply and twist of each thread may be learned. A microchemical test, such as with Millon's reagent, may then be applied to small sections of each yarn and the presence of admixed animal and vegetable fibers determined. The method of mixing is seen as well. Identification of the kinds of fibers in each thread may be carried on as far as possible with powers of 100-400. Only rarely and for very special purposes would a magnification over 500 be used on whole fibers. This systematic study of the fabric would reveal the kinds of fibers present, the yarns that they are found in and the way they are combined in the yarns. In other words, the given

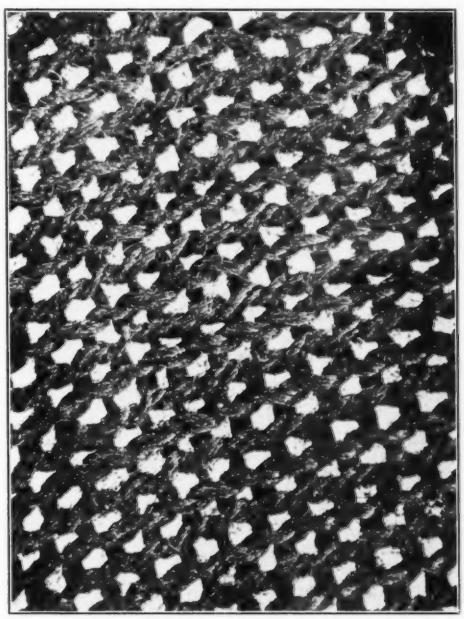

FIG. XV—*Knitted goods x15 taken by axial reflected light coupled with transmitted light*

fibers are correlated into the proper yarns with certainty, and these yarns are correlated as to their relative occurrence and positions in the warp or filling and in the weave of the fabric.

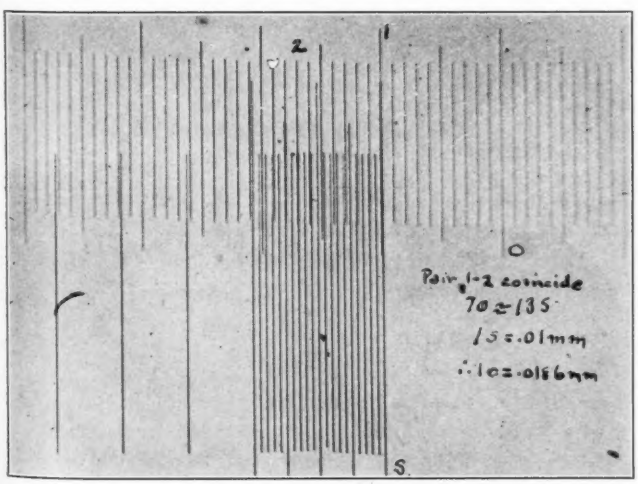

FIG. XIV—*Shows relative positions of ocular and stage scales in standardizing. O = ocular scale; S = stage scale*

2—Measuring Microscopic Objects

Size is one of the important physical properties of objects which is much used in microscopic study. It may be used in connection with length, breadth, diameter or thickness. Not only actual size but also uniformity in size either in a single particle or among several particles of the same kind is noted as a characteristic with some objects. The application of size is varied. For example, it may be for identification of kind or purity, for learning extent of disintegration or subdivision and in estimation of area or quantity or in comparing machine parts.

There are times when the determination of size is qualitative or relative. It is a mental comparison of the size of objects in one sample with that in another. Where a wide difference in actual size or uniformity in size is characteristic, types of objects may be identified in part, or may be compared, by a mental noting of this difference. It is always necessary in making such mental comparisons, however, to make sure of the magnification employed. The unconscious use of

a lower ocular in place of a higher one may throw the examiner entirely off and lead to serious misinterpretation.

In more exact work actual measurements are determined. There are several ways of making measurements. A common and useful method employs a uniformly graduated scale engraved upon a glass disc.

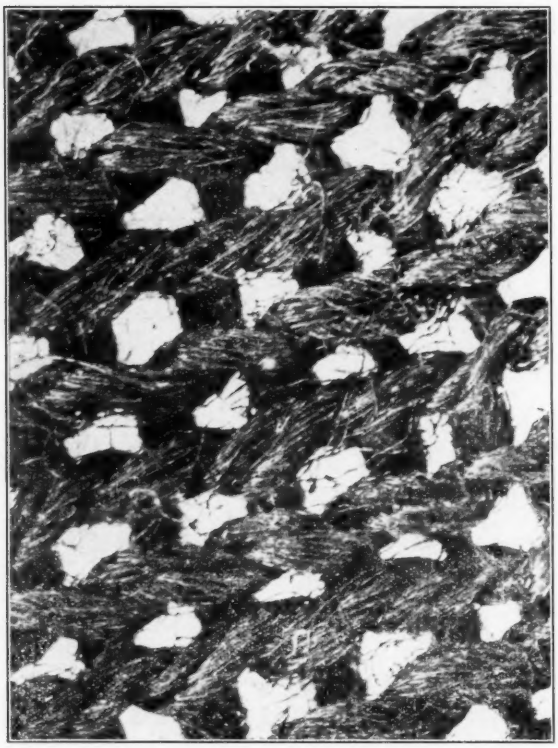

FIG. XVI—*Knitted goods at much higher magnification. Illustration is an enlargement of* FIG. XV. *Note how the detail is much more easily seen.*

This disc fits into the eyepiece and is called an ocular "micrometer." While the engraved lines are in reality equidistant and of definite value, this actual value cannot be used in making measurements. This is because the scale is magnified by only a part of the microscope system; namely, the upper ocular lens. It escapes the magnifying effects of the objective and increased tube length, and therefore its magnification for a given eyepiece does not alter with change in objective or tube length, as does that of the object. Thus the ocular micrometer must be standardized or calibrated for every optical combination of objective ocular and tube length with which it is to be employed. Each combination yields a different specific value.

The standardization of the ocular micrometer is accomplished by comparing the ocular disc scale with that of a stage micrometer. The scale of known value on the stage micrometer becomes an "object" and is magnified in true proportion according to the optical conditions used. All that need be done then is to compare the scales of the two micrometers for every change in magnification. The arrangements of the scales in carrying out this operation is shown in Fig. XIV. From this comparison the value of one division on the ocular scale may be computed in decimal portions of a millimeter. The result may be expressed in these decimals or it may be changed to more convenient whole numbers by dividing by 0.001. This 0.001 is the unit of measurement in microscopy and is called a micron (symbol, Greek letter "mu").

The value of one scale division is then given in microns. Table 3 illustrates the variable values which are expressed in both systems. In making actual measurements the object is so placed as to be upon the scale and the number of divisions noted which the object covers. From this the actual size of the object is obtainable. The stage micrometer is of service for measurement in several other ways. The object may be put directly upon the stage micrometer, but such a way is frequently inconvenient. The image of this scale may be projected onto ground glass and measured (as in micrographic work) or upon paper by use of a camera lucida (as in making tracings of objects). Each of these ways is convenient for special purposes.

3—Special Characteristics Brought Out by Direction of Applying Light

In studying with the microscope the object itself or details or properties in different parts may be brought out by varying the direction of the illumination. The light may be transmitted through the object or reflected by it. Further, the ordinary light rays may be projected parallel to the axis of the microscope ("axial light") or at an angle to it ("oblique light"). The light may also be polarized by sending it through the polarizing apparatus.

Transmitted light is ordinarily employed with minute objects (bacteria, fine particles, minute parts) or transparent sections of objects. Axial transmitted light shows shapes and, to some extent, internal structure. Oblique transmitted light at times intensifies internal structure and may show something of surface condition.

Axial reflected light is used with larger opaque ob-

TABLE 3

Showing variation in value of the same ocular disc micrometer with different optical conditions. First column of values expressed in millimeters; second column expressed in microns. 1 micron = 0.001 mm.

Ocular tube length..	.5x160 mm.		10x160 mm.		10x200 mm.	
	mm.	mic.	mm.	mic.	mm.	mic.
Objective 16 mm....	0.019	19	0.015	15	0.013	13
Objective 4 mm....	0.043	43	0.350	350	.....	..

jects (cloths, metals, papers, rocks), and shows surface appearances only. When oblique, reflected light may intensify surface structure by casting shadows. For special kinds of work there are devices for providing oblique light. A dark ground illuminator uses this principle. The very oblique rays are not visible in the microscope unless some minute particle (colloid or bacterium) intercepts it and reflects it from its surface. The particle is then seen as a white object on a black background. This illuminator is especially useful for motile objects. The ultramicroscopic lighting, employed in examining colloids, is similar except that the light is parallel with the stage. The colloidal particles intercept the light and reflect it upward into the microscope.

Polarized light is used for very special purposes, as in the study of optically active materials (sugars, crystals, fibers). Beautiful and helpful color effects can be obtained under proper conditions. Polarized light at times helps to intensify detail in objects, and in photographic work aids the securing of contrast of object against background.

Each of the various directions of illumination has importance with given kinds of objects. At times, combinations of lighting effects give pleasing results. Fig. XVII was made by oblique reflected light coupled with transmitted axial light. Fig. XV was made by axial reflected light and transmitted axial illumination.

4—Physical and Chemical Treatment of Object

There are many times when much help may be derived in studying an object by giving it a differentiating physical or chemical treatment. This is particularly valuable in studying composition of mixtures. By using (1) proper availabe temperatures to produce changes in state, as fusion or evaporation; (2) solvents to yield solutions: (3) chemicals or stains to cause differences in color: (4) materials to bring about precipitations—by using some of these the microscopic study may be made more satisfactorily.

It may be necessary at times to look at an object from more than one point of view. Such is the case, for example, with fibers and fabrics. In order to learn internal structure, or shape, or internal condition, or penetration it may be necessary to see the material "edge up." This is, in effect, accomplished by sectioning the fiber or fabric into very thin slices which may be placed "end upward" on the slide. The sectioning of such material is a good bit of microscopy which requires special care and treatment, but it frequently yields results well worth the effort.

5—Interpretation of What Is Seen

After the object has been examined and the facts learned there often remains the question of what the appearances really mean. It is well to keep a few possible sources of error in mind in making a decision as to the real meaning. The possibility of undue change in the object as a result of previous physical or chemical treatment or of the action of the mounting medium should be kept in mind. The presence of foreign objects (air bubbles, oil drops, dirt, fibers, etc.) in the mount or on the optical surface is also a common cause for misjudgment. If one is examining sections it is well to know the exact plane of the section with respect to one axis of the object, or false impressions may result. The use of a sample which is a representative one is, of course, essential. Moreover, care to keep it so is highly important. The value of not making too hasty a conclusion from the microscopic appearances

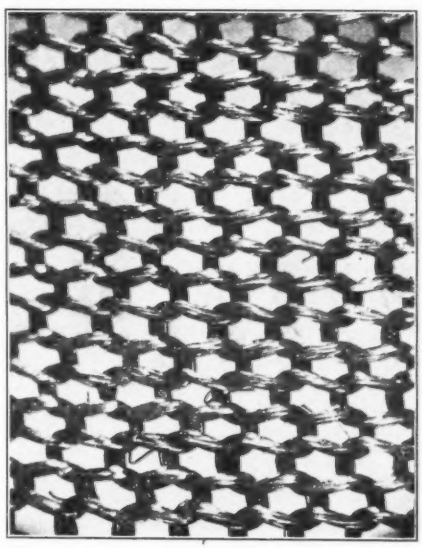

FIG. XVII—*Knitted goods x*15. *Taken with oblique reflected light and transmitted axial light. Compare with* FIG. XV

is therefore easily seen. Careful methods and cautious interpretation are at times both essential.

The real answer to the question of the significance of what the images show is, naturally, drawn from previous experience. This may lie within the records of a published book, or it may come from a comparison with standard samples which are known to give satisfaction. In original work, experiment and testing may be needed to give the needed information.

CONCLUSION

In studying with the microscope, several ways are available for obtaining information—by measurement, by the action of light properly applied, by chemical or physical treatment. The facts are best learned in a correlated manner by beginning with the lower powers and working consecutively to higher magnifications.

Familiarity in the operation of the instrument and of its accessories is rather easily acquired. With its use comes an increased interest in applying it to any of the numerous types of problems for which it is well adapted.

[THE END.]

Things Every Textile Chemist and Colorist Should Know

[*Note—Under this heading is introduced as a more or less regular feature the discussion of certain fundamentals which should be a part of every textile chemist's and colorist's working knowledge. It is hoped that such discussions will instruct some of the younger readers, and serve as a review for those of broader experience and knowledge.*]

No. 4

Reclaimed and Extracted Animal Fibers

General Consideration

RECLAIMED and extracted animal fibers, also designated as "reworked wool," include several types of commercial fibers which have been reclaimed from rags, yarn, or some partly manufactured textile product. Reclaimed wool therefore, consists for the most part of wool fiber in a condition which varies from practically the unchanged virgin wool on the one hand to wool reclaimed from a highly felted fabric, and which may have already been used one or more times.

Three different types of reclaimed wool are recognized in England: Shoddy, Mungo and Extracted wool. They differ chiefly in their source and methods of reclamation. In this country the term "shoddy" is of more general use and practically all types of reclaimed fibers are designated under either the heading of shoddy or wool waste. In order to bring out the specific differences between the different types, however, we will use the English classification mentioned above.

The use of shoddy has in many cases been unjustly condemned owing to the impression that any material containing shoddy is of low grade and undesirable. It is, however, easily demonstrated that it is possible to manufacture a piece of cloth containing as high as 50 per cent of shoddy, and have it when finished a more desirable product to sell at a certain price than a fabric composed entirely of virgin wool. As an illustration, we will assume that a cloth has to be manufactured at a cost of $2 a yard, and that of this amount $1 per yard can be spent on the stock which goes into it. If virgin wool was used it would have to be purchased at $1 a pound. On the other hand, by using 50 per cent of a high-grade shoddy which costs 50 cents a pound, 50 per cent of a $1.50 wool might be used, thus making the cost of stock the same in either case. In the second case, however, the relatively high percentage of a high-grade wool will add desirable features to the finish and durability of the cloth which might not be obtained by the use of all wool of a lower grade as indicated in the former instance.

It must be remembered that there are all grades of shoddy, some grades being almost as good as new wool, whereas other grades which have perhaps served their purpose several times in cloth, might be completely worn out and of but little value. The use of a too low grade shoddy is not desirable, for it produces a cloth which is tender and which will not give serviceable wear. It should also be remembered that the admixture of too much of cotton with wool is fully as likely to be the cause of an unsatisfactory fabric as the admixture of too much reclaimed wool. If all facts are duly considered shoddy is immediately recognized as a valuable raw material of the textile industry and one the value of which is underestimated from an economical point of view. Furthermore, if it was not for the use of reworked wool, the cost of woolen and worsted goods, particularly the former, would be greatly increased, because the world's supply of virgin wool is not sufficient to satisfy all of the demands, and great economic losses would also be sustained, owing to the throwing away of high-grade wool which could well be used again.

The quantity of reworked wool used in the worsted industry is insignificant and the amount used in the woolen industry is nowhere near as large as is imagined by the public.

In 1914, the fibers used in the entire wool manufacturing industry of the United States, according to the census, was in million pounds:

Scoured wool	307.7
Mohair, camel hair, alpaca and vicuna	16.0
Other animal hair	28.1
Recovered wool fiber	70.9
Cotton	35.3
Total	458.0

Shoddy

According to the English classification, shoddy is a wool fiber reclaimed from an unfelted cloth. In other words, from knit goods and worsteds. Certain types of wool waste would also come under this heading. In this type the fibers, not having been felted, remain in perfect condition except for slight injuries which might have occurred during the process of manufacture. In many instances the fiber has already been dyed and in the process of reclamation the different colors are separated as far as possible to produce shoddy of distinctive colors. In many other cases the dye is stripped by the use of proper stripping agents and either left in a light shade, or redyed a

(*Concluded on page* 311.)

Cleanliness in the Scouring of Textiles

Lubrication of Wool—Standard Scour on Heavily Oiled Woolens—Materials for Construction of Textile Plant—the Scouring Shed—Model Design for a Rope-Scourer

By JOHN SCHOFIELD, B.Sc.

From a paper read before the Society of Dyers and Colourists and printed in the "Journal" of the Society

THE subject of the lecture was divided into two parts: 1. Wool Lubrication and Systems of Scouring; 2. Design of Plant and Materials of Construction.

The Lubrication of Wool

In the main, wool oils constituted the principal "dirt" to be removed by the scourer. There were secondary effects of wool lubrication not commonly appreciated.

The curved surface area of a single wool fiber, 1 inch long, and of a mean diameter of 0.001 inch, considered as a cylinder, was 0.00314 square inch and its volume was 0.000000785 cubic inch. If the specific gravity of air-dried wool substance was taken as 1.33, the weight of this individual fiber was 0.0000000038 pound. Therefore the number of such fibers in one pound of wool was over twenty-five millions, and their total surface was approximately 580 square feet. If an oiling for spinning purposes of, say 10 per cent on the weight of the wool was assumed, this meant on each fiber an oil film of, roundly, one-millionth of an inch in thickness. Now, in a teased heap the wool might occupy about one-fiftieth part of the actual heap, the other 98 per cent being air space. It will thus be seen that the problems of penetration, oxidation leading to rancidity, and drying in of the lubricating medium were fundamental to the scouring process.

It was questionable whether the usual method of selling wool oils on the basis of "saponifiable matter" was scientific or even useful. This mode of valuation included neutral oils and fast—i. e., glycerides, etc., as well as fatty acids. But while the latter might be directly saponified in the scouring machines by alkaline carbonates, the former required emulsification by soap in a similar way, though not to the same extent as mineral oils. It was desirable also to specify wool oils on a content of fatty acid. Under these circumstances it was possible, when employing a spinning oil of high percentage in fatty acid, to scour the greasy fabric in alkali (soda ash) alone. This raised the question of standardization in scouring systems, and the following method was put forward as an example.

Standard Scour on Heavily Oiled Woolens

In these cases the alkali would usually be piped onto the machines. If a gauged tank was provided and a 60 to 70 deg. Tw. solution at about 100 deg. Fahr. has been made up, then a total quantity of, say, 20 gallons for each piece in the machine was run in; the drive was started up concurrently so as to distribute the alkali evenly over all the set, and the pieces were pulled forward by hand for one or two minutes to assist the grip of the rollers. If the spinning oil was of the proper quality in free fatty acid content, saponification and emulsification would commence immediately and a dirty lather would form in the machine. This was the first stage of cleansing, and consisted wholly of attack on the superficial oil, flock and general dirt adhering to the fiber. In 5, 10 or 15 minutes this would rise in the machine, and the pieces might then show signs of slipping on the rollers through want of frictional grip in the oily scour. At the first indication of this slowing down of slipping, the sud-box was opened to the drain and this emulsion run off without any use of water. When the machine was almost free from this first lather, the shuttle was closed, 5 to 10 gallons more alkali per piece were added, and the scouring continued. It might be necessary in some cases to run a second lather off, or in extreme cases a third. But no scruples should be entertained regarding supposed waste of scouring liquors; emulsification was proceeding, the dirt was being detached, and no object was served by its retention in the machine beyond a limit indicated by its rise to inconvenient proportions. Alkali (soda ash) was the cheapest of detergents; it was, approximately, one-tenth of the cost of the same weight of soap, and in the above described operation was a superior detergent.

This system might be described as "multiple scouring"; it was based on the following principles:

1. Attack by alkali alone on the free fatty acids of the spinning lubricants with emulsification thereof.

2. The resulting emulsification detaching the superficial dirts from the fiber, and its early removal from the neighborhood of the fabric.

3. The use of a clean and unexhausted scour of good diffusability for the deeper penetrated dirt, which required longer continued action for its saponification and emulsification.

The practical advantages were many: Cheapness by economy of soap; little color bleeding, as the temperature and concentration of alkali were moderate, and the scour was fairly clean for the greater part of the run; softness and handle were conserved by the same conditions.

In from one-half to three-quarters of an hour, the scour would be completed, and the stage of diluting the emulsion might be commenced. Water at about 100 deg. Fahr. should be added slowly, allowing the lather to rise nearly to the sud-box. The shuttle might then be opened, the water—still warm—put on more strongly, and the emulsion run from the machine, continuing until the pieces were perfectly clean. If then the milling process was to follow, they might be "lathered up" by the addition of the proper quantity of soap, and run, say, for fifteen minutes to secure even permeation by the soap. If for dyeing, or to be dried out, the washing off water must be gradually cooled down to final cold water.

The above might be looked upon as a standard system of scouring, applicable to the dirtiest goods. Worsteds did not usually require so drastic a treatment, as the oiling of worsted yarns was very different. A worsted scour might consist of alkali of weaker concentration—down to 2 to 4 deg. Tw.—with some soap, added from the outset. Many worsteds were scoured in cold liquors. The so-called low worsteds—of cotton warps and woolen weft, this latter often recovered wools with low-grade oiling—were best scoured on the multiple system; they constituted one of the scourer's worst problems. Apart from the difficulties inherent in inferior materials, there was the special trouble introduced by the sizing, which might have been overdried and rendered almost insoluble. It was possible that there was a mordanting effect on the gelatine of animal sizes by the chrome or iron of the dyeing process, leading to perfect insolubility; the point required further inquiry. The users of sizings were, as a rule, somewhat reserved in disclosing the chemical nature of their mixtures to a scourer struggling to eliminate them from the fabric. In addition, these low-worsted cloths with abundant cotton were peculiarly liable to develop streaks and patches by surface friction due to worn rollers, tightening up, etc.

Materials of Construction of Textile Plant

The scouring and milling of textile fabrics, like all chemical arts, had to face the problems of corrosion in a more than ordinary degree. Hence the question of materials for the construction of textile plant needed special attention.

Iron

The non-rusting iron adapted for general practice had yet to be discovered. Iron-rust stains were exceedingly frequent, perhaps the commonest of all, on textile fabrics. All iron-work should, as far as possible, be carried outside the machine. Much framework now done in cast iron would be better in mild-steel sections, with advantages in strength and lightness. The use of ball and roller bearings, which might be enclosed and filled with grease, was advisable in certain cases.

Copper

This metal and brass (70 per cent copper, 30 per cent zinc) were practically as objectionable as iron from the staining point of view; fatty acids in oils or soaps formed green copper oleates, etc. The copper pipes in scouring machines, the brass flanges of wringers and milling machines, the perforated copper cages in some laundry-type washers and in hydro-extractors, not to speak of copper vessels and such appliances in dyehouses, were all liable to cause trouble if neglected or employed under wrong conditions.

Lead

The conditions of the scouring shed usually permitted only of the employment of lead as protective covering; it was mechanically weak. While it withstood sulphuric acid well, it was open to attack by alkalis and by bleaching chemicals. The lead flashing usual as a cover for centrifugal hydro-extractors should be covered by a wooden ring; lead was soft enough to rub with coarse wools if in direct contact.

Aluminum

This was a metal of which far too little use had been made in textile plant. It was little acted upon by dilute solutions of the common acids or alkalis or the fatty acids, and even when slightly corroded, its salts were nearly all white. Its specific gravity was 2.6, and parts made of it were usually lighter even when bulkier than corresponding details in other metals. Its tensile strength was low—6 tons per square inch—but it might often be used in sufficient thickness to compensate for this. It was generally cheaper, part for part, than copper or brass. One of its greatest defects was its softness, which rendered it unsuitable for parts involving mechanical wear. The author had successfully substituted an aluminum for a copper perforated roller on the blowing machine, with great advantages to the cleanliness of the wrappers and of the pieces, and also in replacements. An interesting example of the properties of aluminum occurred in its high specific heat (.2) for its specific gravity (2.6); iron had a specific heat of 0.11, and specific gravity 7.7. If ever the price of aluminum became comparable to that of iron, press plates could be made of the former metal to give the same amount of heat with little more than one-third the weight.

Wood

Only a few woods—birch, beech, poplar, and sycamore—were really suitable for parts of machines with which fabrics came in contact, particularly rollers, edges of tanks, spouts and mouthpieces of milling machines, and the like. Most woods of the pine class, deals, etc., contained resin; and a large number of the non-resinous woods, such as oak, contained tannin. Regard must be

paid to the special objects for which the appliance was intended—e. g., pitchpine, one of the most resinous of woods, was very suitable for some tanks where alkalis or soaps did not enter into the question. It must be remembered that most woods resisted dilute acids exceedingly well, but alkaline solutions extracted tannins, resins, etc., from many.

Machine rollers were very important throughout the dyeing, scouring, and milling departments. Soft woods were unsuitable, water and liquors soon destroying their surface The best woods were beech and sycamore, naturally seasoned, and free from defects, knot-holes, bark-scars, etc.; sooner or later caused trouble by decay, leading to mysterious stains. Rollers must be maintained during use in an even, level, and smooth condition; this was best done by turning up in position by a slide fixed across the machine; on this a toolholder, fed by a screw, carried the turning tool—i. e., an extemporized lathe bed. The end grain of rollers was the most troublesome to protect from decay. Painting with the common lead paints was unsatisfactory, as the alkaline liquors soon stripped this covering. Some attempts at creosoting the ends had been made, with but little success. In one experiment the rollers were set on end and paraffin wax melted into the grain by heated flatirons, assisted by a plumber's blowlamp. Flanging with aluminum sheets up to a couple of inches from the circumference would be a good method of protection. Rollers were commonly made longer than necessary; this was waste of valuable timber, and prevented access between their ends and the sides of the machine for cleaning purposes. They were also usually heavier than was required; if more attention were paid to the scour, weight might be saved in the rollers, or the pressure obtained in other ways.

The Scouring Shed

The layout of plant in a scouring and milling shed should be carefully considered, the general principle being that machines should follow each other in the order in which the treatments were given. The floor of the shed should slope slightly—say, 1 inch in 2 feet—so as to be self-draining and automatically self-cleansing. There should be plenty of room at the back of the machines; more was learned from the rush of the scour at the draftboard and rollers than from the open front Tanks for alkali and soap, and filters for water, might be placed along the back, and pipe-runs should be shortened to a minimum. The shafts should be at the back. Steam and water pipes were usually laid overhead; it was debatable whether they would not be better carried in a shallow channel at or near ground level. Drains should slope steeply, to free themselves from flock; the grids of the seak-boxes were best made of perforated aluminum sheet; this looked clean and showed up dirty accumulations, and zinc was too easily corroded. The roofs should be of the saw-tooth pattern, one side glass; the scouring shed should be at least as well lighted by natural lighting as the spinning rooms. The running of a steampipe close up to the roof to prevent condensation had proved useful.

A Model Design for a Rope-Scourer

In the light of the foregoing considerations, the design of a rope-scouring machine fitted with all detail improvements necessary for clean and high-class working would now be considered.

The framework was usually of cast iron; in these days of cheap and rapid welding by acetylene, etc., a triangulated frame of mild steel of suitable angle and channel sections would probably be equally cheap and much stronger. The trough and sides must be of wood; bad knots, etc., must be drilled out and the holes plugged up. The rollers, say, of beech, the lower of smaller diameter. The boardwork might be fastened to the frame by aluminum bolts, in place of the usual wooden pins—or worse, iron bolts—as in this machine there must be no corrodible metal in the interior. The shafts of all rollers should be sleeved in aluminum set into the end grain a little, and carried to the outside of the frame; all bearings should be external, and arranged to drip clear of the inside wall of the machine. The top of the machine frame should be split into halves for easy removal and replacement of rollers. The bottom of the machine should not be quite a symmetrical curve; the lowest point should be nearer the front of the machine, to form a pool, into which the squeezed folds of the fabric dropped as soon as possible and saturated again. The sud-box might be of the ordinary design with holes in the base, and slide-block opening and covering these. It should, however, be made double-bottomed, and the lower board brought forward, say 6 inches, to spill the squeezed-out scour from the rollers onto the falling pieces much sooner than was ordinarily the case. In general practice it was probable that 50 yards out of 60 yards of a piece lay for the greater part of a revolution in the squeezed-out semi-dry state in which they have come from the rollers. This was not scouring; the pieces in the ideal scouring operation were either being squeezed or being soaked through and through, and the sooner the rewetting followed the roller action the better.

The best position for the sprinkler pipe for the supply of hot or cold water for washing-off was a debatable point. English practice favored positions either in front of the sud-box or lying along the front wall of the machine; in Germany it was usually placed behind the rollers and just above the draftboard. The best place was probably along the front of the machine. A copper pipe was general, but aluminum would be better. The perforations were usually too few and too coarse; two rows—half an inch apart—of one-eighth inch holes pitched half an inch, was a very suitable arrangement. The washing-off water did not require to be delivered under more than a 5-foot or 6-foot head. A soft packing of Ruberoid, treated felt, or similar material, should be placed between the frame and the boards to prevent rust-creeping by capillary attraction.

In such a machine, maintained in good order, fabrics of the highest standard of cleanliness might be regularly turned out.

Organic Acids Used in the Treatment of Textile Fabrics

Effect of Chrome and Acid—Available Acids—Acetic Acid—Oxalic Acid—Tartaric Acid—Citric Acid—Formic and Lactic Acids—Still Cheaper Production Needed

By A. J. HALL, B.Sc.

MORE than in the past there is now a greater tendency to pay attention to the durability of fabrics. The dyer's task does not consist merely of dyeing fabrics to shade, but of doing this and conserving their strength at the same time. When one considers the operations which are involved in bleaching, dyeing, printing and finishing, it becomes apparent that the opportunities for a fabric to become weakened are extremely numerous

Effect of Chrome and Acid

The behavior of German soldiers' uniforms during the war led to considerable controversy among those responsible for dyeing them. In particular, the effect of chroming on wool was discussed, and although the evidence was somewhat inconclusive as regards the relative durability of chromed and unchromed wool the importance of a fabric's durability became very apparent. Since then several investigations have been carried out with the object of determining the treatments incidental to bleaching and dyeing liable to cause a fabric to deteriorate appreciably. Undoubtedly, acid treatments are very dangerous in this respect. In the production of colored and even white fabrics, it is impossible to avoid subjecting them to acid treatment and therefore the relative effects of the various acids in use becomes of interest. At present acids are broadly divided into two classes—mineral and organic acids. Mineral acids are not only simpler in constitution, but, as is generally known, they are many times stronger than the average organic acid. At the same time, organic acids are usually dearer than the mineral acids, and largely for this reason—the latter are the more extensively used. Since the mineral acids can cause so considerable a decrease in the durability of a fabric, their use should be avoided wherever possible. And there are many processes where formic, oxalic, acetic and other organic acids can take the place of hydrochloric and sulphuric acids.

Available Acids

At present organic acids of the benzene and naphthalene series find little use in the treatment of textiles. Moreover, it is not likely that they will ever find technical application, for although the objection due to their high cost might be overcome in the future, the ease with which they form colored compounds by oxidation or in contact with metals renders them unsuitable. On the other hand, acids of the aliphatic series, such as acetic and formic acid, are free from these disadvantages and are largely used. In addition to those acids now available there is quite a reasonable possibility that other organic acids will at some time become commercially available. Quite recently, in fact, it has been shown that maleic and fumaric acids can be made by the controlled decomposition of benzene, and that these acids can be used in printing and dyeing. Thus they are useful for chroming wool and the dyeings subsequently obtained possess a good fastness to rubbing, washing and light. They can replace oxalic acid in printing processes and are suitable for use in the dyeing of silk.

It is possible that at some time the various sugar acids may be used in dyeing, for they could be produced cheaply. But at the present time the number of organic acids in use for textile purposes is strictly limited, and it is the purpose of this article to review them briefly.

Acetic acid is perhaps the oldest of the organic acids used for dyeing purposes. It is one of the weakest. In dilute solution—vinegar—it is produced by the aerial oxidation of weak alcoholic liquors. But the acetic acid known to the dyer is never obtained in this manner. It is always obtained as a by-product in the destructive distillation of wood.

When wood is carbonized it yields nearly 50 per cent of a distillate known as crude pyroligneous acid, and this contains 7 per cent of acetic acid and smaller amounts of methyl alcohol, acetone and other impurities. It is the practice to add lime to this crude pyroligneous acid and redistil it, whereby the volatile substances pass over to the condenser, while calcium acetate remains in the still. This residue is subsequently acidified with 95 per cent sulphuric acid, so that on distillation the acetic acid is obtained moderately pure in the distillate, which on redistillation yields pure acetic acid. For the production of glacial acetic acid it is necessary in the distillation to use an efficient rectifying column.

Acetic Acid

When fabrics are treated with acetic acid their deterioration is but very small. This acid, therefore, finds many uses where the stronger mineral acids can-

not be used. Thus sulphur dyes are decomposed when treated with hot hydrochloric or sulphuric acids, so that in the aftertreatment of sulphur-dyed fabrics to increase their fastness to light and washing it is preferable to use a mixture containing 2 per cent of sodium bichromate and acetic acid rather than one containing sulphuric acid. The same consideration holds in the dyeing of wool-cotton union fabrics with sulphur dyes. For the purpose of obtaining shot effects the cotton may be first dyed with a sulphur color and the wool be subsequently dyed with an acid wool dye. In this case the wool should be dyed from a bath acidified with acetic rather than sulphuric acid.

The addition of acetic acid to the dye liquor is often advisable in cases of dyeing with basic colors which show a tendency to rush onto the fabric. Uneven dyeings may thus be avoided.

In aniline black dyeing, acetic acid can replace a portion of the hydrochloric acid which is used. The exact proportion is dependent on the particular process followed, but it can always be determined by experiment. Aniline black liquors containing acetic acid have less tendering effect than those which contain mineral acids alone.

Oxalic Acid

Another useful organic acid is oxalic acid. This differs from acetic acid in being stronger and dibasic. Nevertheless, its tendering effect on textile fabrics is comparatively small.

Oxalic acid is usually made by the alkaline fusion of waste wood—sawdust—or by decomposing sodium formate. It usually occurs in commerce in the form of crystals having the composition indicated by the formula $C_2H_2O_4.2H_2O$.

It can be used with advantage in the chroming of wool. About 2 per cent of sodium bichromate and 2 per cent of oxalic acid should be added to the chroming liquor.

In the form of a double salt—the oxalate of potassium and antimony $K_3Sb\ (C_2O_4)_3.4H_2O$—oxalic acid enables a cheap substitute for tartar emetic to be produced. This complex substance can be used for fixing fabrics mordanted with tannic acid.

In printing many discharge processes require the presence of an acid, and oxalic acid is a very suitable acid to use for such purposes.

Perhaps, however, tartaric acid is employed more largely than oxalic acid. It is almost entirely made from argol, a crust which forms on the sides of the vats used in the fermentation of grape juice for the production of wine. Argol itself is impure potassium hydrogen tartrate—which in the pure form is known as cream of tartar.

It is usual to treat the argol with chalk so as to obtain calcium tartrate, which being very sparingly soluble in boiling water can be easily separated in a pure state. The calcium tartrate is then carefully treated with the correct amount of sulphuric acid, and then the liquid is filtered from the insoluble calcium sulphate so formed The clear solution then obtained is concentrated and then allowed to cool, whereby the tartaric acid separates as anhydrous crystals.

Tartaric Acid

The most important salt of tartaric acid is tartar emetic—potassium antimony tartrate $K(SbO)C_4H_4O_6.\frac{1}{2}H_2O$. It is one of the best agents for fixing tannined cotton. Cream of tartar is very suitable in conjunction with sodium bichromate for chroming wool, since it has a definite reducing action. About 1 to 3 per cent of each substance should be used. It also exerts a favorable influence when added to solutions of aluminium salts which are being used for the mordanting of wool.

Tartaric acid itself, however, is very widely used in printing, and in many processes oxalic and tartaric acids are used together.

Citric Acid

The remaining vegetable acid commonly used by dyers is citric acid. It is almost wholly obtained from lemons and limes, and its manufacture is very largely carried out in the British West Indies and in Italy. These fruits are usually expressed and the juice so obtained is then concentrated and exported as such or after first being converted into calcium citrate—a substance which is more easily handled. The pure acid can afterwards be very easily made from the citrate.

In its properties citric acid very closely resembles tartaric acid It is, however, tribasic, and can therefore form three series of salts. Citric acid is very useful for the discharging of iron, aluminium and chrome mordants, and thus serves a useful purpose in the printing of madder styles. For many purposes in printing, either of oxalic, tartaric and citric acids can be used to replace the other. And in those cases where such a choice is possible it should be remembered that citric acid has the least and oxalic acid the greatest deteriorating action on fabrics.

Formic and Lactic Acids

Two other useful acids are formic and lactic acids, and both of these are steadily coming into favor among textile workers. Formic acid, of course, is much stronger than lactic and acetic acids, but nevertheless it can be dried into fabric without causing appreciable deterioration in strength. The properties of this acid have been dealt with in a previous article (this journal, November 15, 1921), but it is here pointed out that formic acid is especially suitable for use in the chrome mordanting of wool, since not only is the chrome bath more thoroughly exhausted but the wool

is deteriorated by only one-quarter the extent which occurs when sulphuric acid is used.

The present increasing use of lactic acids and its salts illustrates how thorough is the search of chemists for non-corrosive acids. For not one of the processes by which lactic acid can be prepared is simple. They all have difficulties which render them expensive. Yet in spite of this lactic acid is now commercially available.

As is generally known lactic acid is present in sour milk and its presence there is due to bacterial fermentation of the sugar and nitrogenous matters contained by the milk. On the large scale, however, sugar forms the raw material from which the acid is made.

Many methods of conducting the fermentation have been devised with the object of obtaining the greatest yield of acid. In one process, however, a 10 per cent solution containing cane sugar and glucose is first sterilized by maintaining it for about one hour at 95 deg. Cent. By this means all foreign bacteria which would in a later part of the process give rise to acids other than lactic acid are thus destroyed. The solution, which must not be acid, but either neutral or alkaline, is then cooled, and to it is then added a suitable culture of a lactic acid ferment. From time to time chalk must be added to the fermenting liquid. Otherwise the acidity of the solution, due to the steady formation of lactic acid, would seriously retard fermentation.

After a few days, when the process is complete, the resulting solution contains calcium lactate and insoluble organic bodies. It is then filtered (calcium lactate is soluble in water) and the clear solution treated with sulphuric acid. In this manner insoluble calcium sulphate and the free lactic acid are formed, and after filtration the acid solution can be concentrated to the desired strength.

Lactic acid has the composition indicated by the formula CH_3CH (OH) COOH.

Lactic acid can very advantageously be used in the chroming of wool and the luster and soft handle of this fiber are not materially diminished in the treatment. Lactates of potassium and antimony also find use as substitutes for tartar emetic. The acid can also be employed in various discharge processes in printing and is suitable for use in aniline black dyeing. It is only the high price of lactic acid which limits its application in processes of textile treatment.

Cheaper Production Needed

It is thus seen that there are several organic acids which are available for purposes of textile treatment. They have the advantage of causing a much smaller injury to fabrics than the commonly used mineral acids, but owing to their comparatively high price they are used less extensively than they otherwise would be. It remains for manufacturers to produce these acids more cheaply so that they could be more generally used. Then dyers and printers would be able to produce more durable fabrics than is possible at present. —"Dyer & Calico Printer."

The Control of Chlorine in the Bleaching of Cotton Goods

Advantages of Chlorine-Soda Chemic—Early Batch Mixing Practice with Chlorine—Excess of Alkali Required—Preparation of Neutral Chemic—Flexibility of Operation—Bleaching Installation—Savings by Use of Apparatus

By C. M. EDWARD SCHROEDER

SINCE liquid chlorine became available on the American market in convenient form for handling, the preparation of bleaching liquors of superior quality and uniform composition at once established an improvement which rapidly superseded the more cumbersome and uncertain production of bleach liquors from chloride of lime or bleaching powder. Prior to the introduction of liquid chlorine there had been no material change in the process of cotton bleaching for many years, but the preparation of sodium hypochlorite bleaching liquor or chemic with chlorine constituted an improvement of great practical value.

The immediate advantages, aside from cleanliness and ease of handling, derived from using chlorine-soda chemic over the old chloride of lime or bleaching-powder solutions are twofold: (1) Chlorine-soda chemic can be made up under constant control of bleaching strength, in clear liquors, ready for immediate use. (Chloride of lime losing strength on exposure, and depositing sludge in making up.) (2) There being no lime salts present as in the chloride of lime chemic, goods will not be in danger of tendering or discoloration, and for the same reason goods for dyeing will not show unevenness from lime residues.

During the writer's experience of about ten years past in the handling of liquid chlorine for bleaching purposes, certain improvements and economies have been developed in the matter of control which makes this seem a subject worthy of description.

Early Batch Mixing Practice Using Chlorine

In the early experience with preparation of chlorine bleach no attempt was made to control the gas supply by means of special apparatus, but as the gas was obtainable in steel cylinders, holding approximately 100 lb. of chlorine (the filled cylinder weighing about 200 lb.), it was simply necessary to place the cylinder of chlorine on a platform scale and note the amount of gas used up in the preparation of stock chemic.

For further convenience in the daily preparation of large quantities of bleach-liquors, weighing the chlorine was dispensed with, as it was necessary only to discharge one full cylinder into each tank of soda liquor, holding about 800 gals., the cylinders being connected to a half-inch lead pipe leading to the bottom of tanks holding the liquor, and the chlorine allowed to enter at full capacity. Of course, means had to be employed to overcome reduction of the gas flow due to lowering of temperature caused by such rapid evaporation.

Formerly this was accomplished by placing the cylinders in tubs supplied with warm water, but later the liquid chlorine was allowed to flow from the cylinders placed in a horizontal position, and was conducted through a coiled section of the lead pipe submerged in a tub of warm water, the expanded gas escaping from the end of a lead pipe at bottom of chemic tank. By this means 100 lb. cylinders could be emptied in from one to one and a half hours.

Excess of Alkali Required

It may be observed here that bleach liquors prepared as above described necessarily contain an excess of alkali to ensure stability, which in the case of soda ash is not of much consequence, excepting as regards cost, but in using an excess of caustic soda there is always danger of deleterious action on the cotton fiber, especially in warm weather, when oxycellulose is likely to form while the material is undergoing the bleaching operation, and may cause subsequent tendering and yellowing of the fabrics.

Before the introduction of proper control equipment, the procedure was as follows: At first soda ash alone was used to absorb the chlorine, in the proportion of about 3 to 1—that is, taking 300 lb. of soda ash in 800 gals. of water to each 100 lb. of liquid chlorine. This when run in the bleaching machines at 1 to 1½ deg. Tw. furnished a safe and active bleach, although the actual cost of such a bleach was somewhat higher than bleach made of chloride of lime. This cost was later reduced when the chemic tanks were charged with waste caustic soda recovered from mercerizing washings running from 4 to 6 deg. Tw. and enough soda ash added to bring the Twaddell up to about 10 deg.

The excess of soda ash was required to ensure stability during the rapid absorption of the gas and while storing the chemic. The bleaching strength was determined on each batch made by titration with N/10 arsenious acid.

Preparation of Neutral Chemic

With the installation of Wallace and Tiernan chlorine-control equipment, the possibility of preparing neutral chemic from caustic-soda solutions at once removed the foregoing objections.

There being no need of using an excess of alkali with this method, the cost of soda ash formerly required was entirely eliminated, the waste caustic from mercerizing washings furnishing the necessary supply of alkali. On account of the perfect control of pressure and rate of flow of chlorine, it is possible to utilize caustic liquors of any convenience strength and obtain a sodium hypochlorite of any desired composition and uniformity. That is, by adjusting the chlorine feed-valve to supply just enough chlorine to combine with the sodium hydroxide in the caustic liquors, there is formed a neutral hypochlorite solution in accordance with the reaction:

$$2NaOH + 2Cl = NaOCl + NaCl + H_2O;$$

and such a bleach liquor is at once ready for use from the moment of starting and as long as the machine is kept running.

Flexibility of Operation

A valuable feature of this apparatus is its flexibility in operation. For instance, if a bleach liquor is required for storing any length of time, a slightly alkaline liquor can be prepared by simply reducing the proportion of chlorine to the caustic content of the absorbing liquor.

Or, if an acid bleach is required, an excess of chlorine is fed in, giving a hypochlorite solution according to the following reaction:

$$2NaOH + 4Cl = 2NaCl + 2HOCl,$$

thus furnishing a safe means of producing the more rapid hypochlorous-acid bleach without the danger of liberating free chlorine, as was apt to occur by the old practice of adding acids to bleaching liquors, with attending deleterious effect on the goods.

Description of Bleachery Installation

A Wallace and Tiernan control equipment which has been under the writer's observation since August, 1920, at the plant of the Standard Bleachery Company, Carlton Hill, N. J., was installed to produce 500 gals. of bleach per hour, using only waste caustic liquors of about 4 deg. Tw. for absorbing the chlorine and furnishing a steady supply of chemic with from 1.25 to 1.5 per cent available chlorine.

The apparatus consists of a panel upon which is mounted a specially designed injector which effects the combination of the chlorine with the caustic solution. This combination is practically instantaneous, the chemic of full strength and ready for use, passing immediately to the stock tank. Indicating meters of the Venturi type are placed in both the chlorine and caustic lines on the panel. The chlorine gas is supplied at the desired rate and under constant pressure from an evaporator that is essentially a steam-heated water bath equipped with thermostat control and pressure-regulating valve.

Savings by Use of the Apparatus

The saving in cost of soda ash in one week's run with the control of equipment as compared with a week during which the same yardage of goods was run by the older method amounted to $33.

A comparison of six weeks' steady running of the control equipment with a similar period using part soda ash for chlorine absorption showed a total saving of $219, or $36.40 per week.—"Chemical and Metallurgical Engineering."

ILLUMINATING RESERVES (COLORED RESISTS) UNDER SULPHIDE DYES WITH VAT DYES OR SULPHIDE DYES

L. Diserens

After a number of preliminary experiments, satisfactory results were obtained by padding the material in a solution containing 100 grams sodium carbonate and 40 grams glycerine per liter, drying and printing a mixture prepared from 150 grams Ciba Blue 2B, 20 per cent paste, 480 grams 25 per cent paste of British gum, 250 grams of 30 per cent solution of hydrosulphite sulphoxylate, 100 grams zinc chloride, 20 grams China clay, and 20 to 40 grams ferrous sulphate. The printed material is passed twice through the rapid ager, padded between the rollers with a solution of 40 grams Immedial Carbon BN, 40 grams sodium sulphide, 10 grams 32.5 per cent caustic soda, and 40 grams castor oil soap per liter, dried and passed twice through the rapid ager. Rinse in water, pass through a bath containing 50 grams 3 per cent hydrogen peroxide per liter, rinse, acidify, rinse, soap and dry. British gum undoubtedly was the best thickening to use, and the presence of some ferrous sulphate in the printing color was advantageous. By increasing the quantity of zinc chloride of 250 grams per liter dyeing with the sulphide color may be effected in an open bath and darker shades obtained. Moreover, it was found that zinc chloride could be used in the printing mixture in presence of alkali, so that the vat dye was not reduced in the printing paste, but only when passed through the rapid ager. A labile combination between the vat dye and the fiber was first formed, the dye being reduced by the hydrosulphite in the rapid ager, and fixation completed in the alkaline sulphide dye bath. The quantity of caustic soda used is sufficient to neutralize about 25 per cent of the zinc chloride used, thus a mixture of 150 grams Ciba Blue 2B, 20 per cent paste, 250 grams of 35 per cent solution of hydrosulphite-sulphoxylate, 250 grams 35 per cent paste of British gum, 250 grams zinc chloride, 100 grams 32.5 per cent caustic soda is printed, dried, passed twice through the rapid ager for four minutes dyed in the sulphide dyebath as above, rinsed well, acidified, rinsed and soaped. By this method sulphide dyes which are not very sensitive to zinc chloride, e. g., Sulphur Blue (Berlin), may be used for illuminating the reserve. It should be noted that excellent results are obtained by printing a mixture containing a vat color, zinc hydrosulphite and an alkali (caustic soda, borax, or sodium acetate), although this method requires special care. —Rev. Gen. des Mat. Col., through Jnl. Soc. Dyers & Colourists.

IMPROVED DYEING PROCESS

An improved process of aniline dyeing fabrics has recently been patented and is the result of a combination of certain old steps used in aniline dyeing with the process for waterproofing in such a way as to produce a new process giving a superior result. In the dyeing of cotton and silk it has been customary to impregnate the fabric with a mixture of aniline salt and chlorate of potassium or chlorate of soda, preferably in conjunction with a metallic salt, such as copper sulphate and then to develop the color by the process known as aging, which ordinarily consists in exposing the material so impregnated to the action of warm moist air until the first stage of oxidation has been reached the final oxidation being effected by passing the material as it comes from the aging chambers through a solution of a chromate or bichromate of an alkali. This final step is objectionable in that it is difficult to maintain the chrome both of uniform strength and it frequently results in weakening the goods and moreover it is difficult to produce the desired black, uniform in shade and quality and free from any objectionable tint of green or any other color.

According to the improved process the last step of passing this fabric through the chrome bath is omitted and the fabric is taken directly from the aging chamber to suitable machines adapted to give it the waterproofing treatment, which consists in impregnating the cloth with a saponaceous liquid such as sodium palmitate and aluminum acetate or sulphate and subjecting it to the effects of an electric current.

When the ordinary aniline black process is modified by eliminating the final step as above described, and the material is taken direct from the aging chamber to the waterproofing machines, there is produced a black which will not change color or green and the fabric is somewhat stronger than when treated in the chrome bath. The fabric, moreover, is waterproof and as the process is continuous, it may be economically carried out and all irregularities due to the weakening of the chrome bath eliminated.

AMERICAN
DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY
PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL
Advisory Editor

LAURANCE T. CLARK
Managing Editor

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PROCEEDINGS OF THE A. A. T. C. C.

ONCE again announcement is made by officers of the American Association of Textile Chemists and Colorists that, owing to the fact that there have been no meetings of the Council or of the local Sections recently, there is not sufficient material to warrant printing the Proceedings of the organization in this issue.

Meetings scheduled to take place at the time of going to press include those of the Research Committee and of the Council, both of which will be held at the Engineers' Club, Boston, Mass., on Saturday, April 22. On that date there was also planned a meeting of the Northern New England Section at the Engineers' Club, Boston, at 5 o'clock, which was to take the form of an "experience meeting" devoted to the general subject, "Shady Goods." According to the announcement of A. K. Johnson, Secretary of this Section, those scheduled to read five-minute papers before the regular discussion were Frederick Spencer, Leverett N. Putnam, Louis F. Bume, Frank E. Johnson and Walter F. Haskell. A meeting of the New York Section was scheduled for Friday evening, April 21, at the Pennsylvania Hotel, that city.

Reports of these meetings and other activities will appear in the Proceedings in the issue of May 8, which will also include the final part of "The Development of Tests for the Fastness of Dyestuffs" (Murray).

THREE FULL YEARS

ACCORDING to the present text of the proposed dye section of the Fordney permanent tariff, the licensing control of dye importations is to be extended for one year after date of the passage of the act, whenever that may be; and, in addition, President Harding is expressly empowered at the end of that year to extend the licensing system for yet another year if he finds conditions warrant such action. In view of the fact that any investigation of that sort would undoubtedly reveal the necessity for such extension, and of President Harding's well-known attitude toward the industry, the necessity for its preservation, and the inadequacy of straight tariff methods for accomplishing this, it seems reasonably certain to predict that the licensing system will remain in force for two full years, plus the length of time which will elapse between today and the date of passage of the Fordney measure.

This hope is possible for the reason, outlined in our last issue, that it is believed that the recommendation of the Senate Finance Committee will not meet with sufficient opposition on the floor of the Senate to prevent the passage of the dye section, unchanged.

Should this occur, as it probably will, it will be a signal for many of the representatives of our daily press, and some of our trade press, to say, editorially, "This should satisfy the dye makers. Two more years of protection should be sufficient."

But it should not and does not satisfy the dye makers, nor the majority of dye consumers who want to see the domestic industry develop its service to them, for the reason that two years is not sufficient time in which to expand to a point where that service can be provided in a satisfactory manner. But even assuming, for the sake of argument, that two years would bring about this happy result, still the arrangement is neither fair nor satisfactory to the dye makers and the consumers above specified.

Those acquainted with conditions are reasonably sure, and in many cases may be willing to assert, that there will be two more years of licensing protection. Let the reader suppose that he is willing to write and publish such an assertion. Then let him take his published statement to the president of a bank and ask the latter to lend him several thousand dollars with which to bet that his published assertion is correct.

The reader knows what the bank president's answer would be, or what his own would be if similarly placed. He would not think of doing such a thing; yet that is exactly what the dye industry will have to do if it is to achieve real progress in the two years of protection which may lie before it. It must ask the banks to lend it money with which to bet that President Harding's recommendation at the end of a year will be for an additional year's protection.

Owing to the innumerable and exasperating delays which have prevented the passage of really constructive dye legislation ever since May, 1919, opponents of adequate protection are enabled to say that the industry has enjoyed three years of protection already, and that it has now been given two years more, making a total of five. It is easy to see how misleading such a statement, in clever hands, can be. The true state of affairs was again emphasized recently by Dr. Charles H. Herty, president of the Synthetic Organic Chemical Manufacturers' Association of America, who pointed out that the proposed plan would only aggra-

vate a serious situation, and would in no way be more helpful to the industries than would the tariff rates proposed by Senator Smoot.

"What we must have," Dr. Herty declared, "is the assurance that manufacturers of dyestuffs can go on for a definite period without fear of foreign competition, before banks and other financial institutions will feel secure in loaning money for the promotion and continuation of the chemical industry. Without definite assurance from Congress that the industry will be protected by the licensing system for at least three years, there is no need of looking to financial institutions for capital to carry on development work."

It is true, therefore, that the dye industry has had three years of licensing protection, but when one considers that these three years have been offered it piecemeal, often for only a few months at a time, and never for any fixed period, one can readily see why the three years have not produced anything like the maximum progress, and why two years more, on practically the same terms, can only be a hollow mockery of protection.

And, finally, two years, even under ideal conditions, is not sufficient. That is not the fault of the dye makers, but merely of natural conditions over which neither they nor Congress have any control. Three years of definitely assured protection might suffice; it is, at least, the minimum time in which satisfactory results can be secured.

Therefore it is the determination of the dye and coal-tar chemical industries to make another stand for three full years before the measure is disposed of by the Senate, and in this effort they should receive the support of all consumers who have the good sense to look beyond the immediate present.

"THE NEXT BIG THING"

IT is estimated that at the present time there are between 500,000 and 600,000 amateur "sets" for receiving wireless telephonic messages in the United States, and it is known that by far the larger portion of these have been installed during the past year—perhaps during the past seven or eight months. The reason for this enormous and remarkably rapid increase in the use of these instruments is found in the programs of musical entertainment, lectures, children's stories, news and market reports, official time signals, weather predictions, etc., which are broadcasted daily by the sixty-odd sending stations devoted to this purpose.

Many who read this will already be aware of the facts given above, and indeed are probably making use of their own instruments; but those who are not will soon have it literally forced upon their attention, for radiotelephony can no more be ignored than the automobile; it is neither a nine-day wonder nor a fad of the moment. As an intimate concern of the human race, it is, beyond a doubt, "the next big thing."

Aside from this aspect of it, it is believed that there are reasons why practically all readers of The Reporter will feel at least an academic interest in this new and swiftly expanding industry. Not only does it furnish some striking comparisons and contrasts with the dye industry, but likewise within it dwell possibilities which may recommend themselves as being more or less worth looking into—merely as a side issue, of course!

Let us begin with a contrast. "This," according to a writer on the subject,* "is how a wireless fan in England sends a message: First he writes it out on a very thin piece of tissue paper. . . . Then he goes out into the yard or up on the roof, opens the door of a little shed, ties the message to the leg of a carrier pigeon he finds there, and turns the pigeon loose. There are hundreds of thousands of these pigeon wireless fans in England. The trouble they go to in order to get a message to a friend is astonishing. It is about a three-day job. . . . And the carrier pigeon fan is about the nearest thing they have to a wireless amateur in England. The laws against the wireless amateur in England are so strong that there's hardly any use of a young man either making or buying an outfit."

Which is distinctly worth noting at the present time.

"Across the English Channel in France, the amateur wireless fan, Pierre, must do everything under the bed. Let one of his ether whispers get out into the air, and he'll have a Government policeman at his house in short order. The French army owns French ether, and it doesn't allow any loafing or trespassing therein. I traveled from one end of France to the other last year, and criss-crossed the country, but never once did I see an amateur wireless set. . . .

"In Germany the Government owns the ether. An amateur has no more right to trespass therein than he would have to go behind the screen in the post office and help to sort letters or sell postage stamps. I tried to find wireless amateurs in Germany last winter and I discovered not one. It might be possible for an amateur to rig up an apparatus secretly and listen in on Nauen, but your true amateur is not satisfied with playing the sneak and listening in without taking an active part in the throbbing of the ether waves.

"In little Holland, now and then, you see the rigging of an amateur wireless on private homes. But these are always fine big homes and you realize that here the wireless set is the toy of the rich."

What is found, then, in the United States? The answer is contained in the opening paragraph of this article—and what is more, the Government of this country has for the past ten years offered the amateur every possible encouragement, has assigned him station call numbers and published them, has allowed him to listen in on anything his apparatus could pick up, and has generally displayed an attitude calculated to foster the increase of trained operators, or young men who could be made into trained operators on short notice with very little addi-

*William G. Shepherd, "Popular Radio," May, 1922.

tional instruction. And the wisdom of this policy was more than demonstrated during the war, and would be demonstrated again, still more potently, should the war be repeated.

With the recent great increase in popularity has come a conference in Washington, at which, for the prevention of undue interference, special wave lengths were assigned to various classes of stations. Secretary of Commerce Herbert Hoover has been given control of the regulation of this huge business. And the able and far-seeing Mr. Hoover says:

"In certain countries, the Government has prohibited the use of receiving instruments except upon payment of a fee. . . . I believe that we ought to allow anyone to put in receiving stations who wishes to do so. But the immediate problem arises of who will do the broadcasting and what will be his purpose. It is my belief that, with the variations that can be given with different wave lengths, through different times of day, and through the staggering of stations of different wave lengths in different parts of the country, it will be possible to accommodate the most proper demands and at the same time to protect that precious thing—the American small boy, to whom so much of this rapid expansion of interest is due."

By this time we have seen quite enough to realize the fundamental difference between the attitude of the United States Government toward the subject of radiotelephony, and the attitudes of European Governments. The development of the radio industry is now as important to any country as is the development of the coal-tar chemical industries. Our Government is showing signs of going to as much trouble to encourage radiotelephony as did the German Government to encourage the coal-tar chemical industries—which have met nothing but discouragement in the United States. For once we appear to have "stolen a march" on the field in a subject of vital importance to all of us, and in view of this it is just a little difficult to understand how our Government can be so alive to the future uses and possibilities of the one, and so unresponsive to the inherent uses and possibilities of the other. Can it be that we are waking up, and if so, will this new alertness extend to another equally vital industry before it is too late? It is to be hoped that it will.

The subject under discussion is an extremely broad one, and hence we must hurry on. Further points of interest to be noted in passing are that Germany, for one, does not propose to remain asleep long, for already a group of German business men are planning a visit to the United States for the express purpose of studying conditions in our radio industry, the handling of the amateur, factors influencing development, etc.; that the present condition of the radio industry parallels very closely the condition of the dye industry in the days when the "gyp" was rampant and the demand had so far outstripped production that hundreds of would-be Wallingfords were constructing, owned stock in, or were agents for, "dye plants" with the result that the market was flooded with all sorts of rubbish; and that the new industry has already begun to make increased demands on our coal-tar chemical manufacturers for phenolic condensation products such as Bakelite, Condensite and other efficient insulating materials for panels and parts of apparatus.

All this, as before hinted, is probably of at least academic interest to readers of The Reporter; but now, it seems, there may be an angle of the industry in which something more than an academic interest can be felt.

At the dye hearings being conducted by the Senate investigators, an elderly lady describing herself as Dr. Emma Reba Bailey, of Rome, Ga., rose and asked to be heard on the dye question, stating that the *vox populi* had not been represented at the hearings and that she intended to assume the burden of representation herself, since no one else would come forward.

She then said that German dyes were far superior to American dyes, and that she wanted no restrictions in the way of obtaining them.

"The black waist which I have on, given me by my daughter for a Christmas present, will not stand washing, and the dye rubs off whenever it is worn," she is reported to have said. "I come from a cotton country, and I think we are entitled to dyes that will stay fast on cotton textiles." She added that if there were but 150 manufacturers of dyestuffs in the United States, the industry was a monopoly, and that the 110,000,000 people in the country should be considered, rather than a handful of manufacturers.

Chairman Shortridge, amid general amusement, courteously suggested that Dr. Bailey get in touch with Herman A. Metz, who both manufactured and imported dyes and who declared his manufactured products to be the equal of any of the foreign.

Now this incident, aside from providing material for a little mild merriment, should likewise provide food for a little serious thought. Here is a woman, mature, of sufficient intelligence to obtain a degree, whose reasoning processes are beyond a doubt average or better, who merely lacks possession of a complete set of facts to consider before making a final deduction; and in any case she is entitled to credit for having the courage to go before a United States Senate committee with her views But the real point is that there are thousands of Dr. Baileys, both male and female, in this country, and that they, in the aggregate, are largely the force which animates, or checks, Congress. And as has repeatedly been emphasized, full information on the subject of dye protection would have led to definite action of some sort before this.

One of the best ways of fostering progress is to make a subject understood to a majority of the active people concerned. How to disseminate the necessary information in the most efficient manner—which means in the shortest possible time and at the least expense—is difficult, sometimes, to decide. A new implement is at hand. No one dreamed of broadcasting's possibilities ten years ago. To quote another writer, "It was regarded as a serious limitation that radio communication was not secret and that there was no more privacy about a message than there is about a corner political meeting. What

was once a drawback, however, is now a technical virtue. Broadcasting, a new way of reaching thousands, and even millions, is the outcome. . . . Education? We shall hear the Einsteins and Wellses of the future radio university expound their views to us with as much personal directness as if we were sitting in their presence. We used to call the telegraph and telephone "space annihilators." Space annihilation, indeed! We never knew what the term meant until radio broadcasting came."

And, while the above is somewhat general and refers in part to the future, the important specific details of it are that, without waiting for any further development, broadcasting to-day furnishes a means of reaching larger audiences than could be assembled save by a great public demonstration of some sort, or the advertising of a world-famous artist or notable personage; that practically all broadcasting programs daily include one or more fifteen or twenty minute lectures on every conceivable subject of educational or general interest, and that, so far as is known, arrangements to speak can be made by any one who is willing to volunteer his services, provided his subject meets with the approval of those in charge.

That is all in the way of a thought we wish to leave with readers at present. Viewed from the outside, this subject plainly indicates its claim to further investigation by those desiring to impart real information on topics concerning the welfare of the country at large. Those who have not acquired the proper mental background from the foregoing extremely limited exposition of the subject will have to go the rest of the way for themselves, upon having done which they will realize, we believe, the possibilities we have tried to point out, and will be able to establish the very real and intimate connection which now exists between themselves and the public. Or it may be that we shall again comment upon it in these pages, even at the risk of "dragging in," so to speak, what must yet appear to some to be a foreign subject.

Let us assure such, in conclusion, that it is not a "foreign subject," and once more bear heavily upon the fact that the amateur radio receiving set is neither a toy nor a fad. This being the case, its possible relation to the cause of any fundamental concern of our national life must be considered.

URGES A. C. S. TO FORM GAS DEFENSE COMMITTEE

Dr. W. C. Geer, of Akron, Ohio, urged the American Chemical Society at Binghamton to take steps to form a "gas defense committee," as a means of protecting Americans in case of another war.

"Our friends in Washington," said Dr. Geer, "may agree to abolish poison gases from warfare. We should, however, be active in preparing methods of defense. We are forbidden to carry concealed weapons, but there is no law of God or man to prevent us from the use of locks on our doors and bolts on our windows.

"I would earnestly recommend to the American Chemical Society the formation of a gas defense committee to investigate gas masks and other protective clothing, alone, as far-sighted patriotic citizens, if co-operation with the War Department be not allowed. It is a field in which research work of a co-operative character can be undertaken, with who knows what valuable results to us in the future."

INQUIRY DEPARTMENT

All classes of chemical work or advice relating to artificial colors, natural dyestuffs, dyewoods, raw materials, extracts, intermediates, crudes, or dyeing chemicals and accessories in general, will be carried out for readers and subscribers of the AMERICAN DYESTUFF REPORTER by this department.

Inquiries of a minor character will be answered on this page, while major matters involving personal investigation, analyses, perfected processes and working formulas, will, if desired, be treated confidentially through the mails. In answering inquiries which, by their nature, require reference to the products, processes or apparatus of some particular manufacturer we aim to be absolutely impartial. We refer the inquiries to specialists whom we believe to be best qualified to answer them intelligently, and must disclaim responsibility if their reports show unintentional bias. All questions, materials for analysis or letters leading to the opening of negotiations for special work will receive prompt attention if addressed to Inquiry Department, American Dyestuff Reporter, Woolworth Building, New York City.

F. A. A.—*Question:* I am enclosing a sample of raw cotton stock dyed with Katheton Tan, 9 per cent shade, 6½ per cent Na_2S, 1½ per cent Na_2CO_3, and 20 per cent NaCl, well washed, and aftertreated with 1 per cent $Na_2Cr_2O_7$, 1 per cent $CuSO_4$, and 2 per cent HCOOH. After this treatment the stock is again well washed, extracted and dried.

This stock does not card well and in the spinning breaks continually. I would like to have you examine the enclosed sample carefully, and, if possible, suggest a remedy for the trouble now being experienced.

Answer: We are of the opinion that the trouble with the material submitted is that it is tender. This explains why it does not card well or spin well and breaks continually.

As to the exact reason for this condition we cannot say, but it is probable that it is owing to the development in some way, through oxidation, of free sulphuric acid in the stock, perhaps after it has been washed and dried. It should be thoroughly washed after it is dyed before aftertreatment and it would be well, after the aftertreatment and washing, to give it a final rinsing in an alkaline bath or one containing sodium acetate, leaving a little of these materials in the fiber.

B. L. M. Co.—*Question:* I am sending you under separate cover clippings of artificial silk lace with a mixture of silk and cotton in the gray. Also a sample of bleached silk, together with various dyed samples of the same fabric.

I have found it a very difficult matter to overcome the striped effect which you will note in the various dyed samples. Likewise note same in the original raw sample. This no doubt is due to the chemical reaction on the different grades of artificial silk when manufactured or bleached.

I would greatly appreciate it if you would kindly advise through your Inquiry Department how I may overcome this difficulty.

In our opinion the only real solution of your problem lies in the weaving; the fact that two kinds of artificial silk were used being responsible for the uneven results.

We have performed several experiments in an effort to determine if it were possible either to retard the dyeing of one type or accelerate the dyeing of the other, but have had only indifferent results. In some cases it has been possible to get an approximately even shade, but inasmuch as each color would have to be treated in a different way, and as it has been impossible to get really satisfactory results in any case, we feel that the only way for you to utilize this stock is to endeavor to turn the condition of your woven material into an asset and try for two-color effects. This would, however, be a pretty difficult proposition and we believe the only real solution is for you to insist that your material be woven with the same character of raw silk throughout.

Review of Recent Literature

The Fundamental Processes of Dye Chemistry. Dr. Hans Eduard Fierz-David. Translation of Frederick A. Mason, M.A. (Oxon.), Ph.D. (Munich); 236 pages and index; 6x9; 45 illustrations, including 19 plates. New York, D. Van Nostrand Company.

While excellently filling the needs of both beginning and advanced students—particularly those about to enter upon careers as works chemists, this volume should form an almost invaluable adjunct to the library of the laboratory worker to supplement his textbooks on laboratory practice. It is thorough, comprehensive, and lucid. As the author points out, ignorance of elementary facts leads to waste of time in practice. Time thus wasted may be saved in future by suitable instruction; nor should it be forgotten that many of the essential features of chemical craft may be learned from books. Although well aware of the existence of a large literature dealing with laboratory practice, the author holds that there does not appear to exist a suitable introduction to the fundamental operations of dye chemistry. The present work is an attempt to fill that vacancy.

The subject is divided into sections dealing with intermediates, with descriptions of their production in a manner which should be helpful even to those unfamiliar with technical operations; the dyes themselves, technical details, and analytical details. Since azo colors form the largest class of artificial dyes, most attention has been given to the preparation of the necessary intermediates; but since, however, many of these intermediates are also used in the synthesis of other classes of dyes, such as Indigo, Azines, Thiazines, Aniline Black, the sulphur colors, and Triphenylmethane dyes, the field of synthetic colors in its essential features is covered by the present volume. There are also given recipes for a few dyes, together with general observations on the technique of dye manufacture. With only trifling exceptions, the dyes dealt with can all be obtained from the intermediates described in the first portion, so that the reader is enabled to obtain a comprehensive view of the successive stages of development of a dye. The first few recipes are given in as great detail as possible, frequent reference being made to them later. An attempt has been made to describe the processes in such a way as to give, besides the laboratory details, a clear indication of the method of carrying out the process in the works. There would be no point whatever in giving either laboratory recipes or works recipes alone, as only by acquaintanceship can the budding chemist get an insight into the technical side of the industry.

Anticipating a possible objection that the patent literature of the subject has been almost entirely neglected, the author discloses his intention to avoid, as far as possible, confusion of the beginner by numerous references, but adds that those who desire information on patents will find their requirements admirably met in the works compiled by Friedlaender and by Winther.

The recipes given in this work are intended to be regarded in the light of finger-posts, and they make no claim to being the best, since "many paths lead to Rome." All the examples given, however, have been actually tested by the author, and in the majority of cases they have also been put through the works under his personal supervision, so that they may be regarded as being technically satisfactory.

The complete list of contents includes:

I. Intermediate Products.—(1) Suphonations; (2) Nitrations and Reductions; (3) Chlorinations; (4) Oxidations; (5) Condensations.

II. Dyes.—(6) Azo Dyes; (7) Triphenylmethane Dyes; (8) Sulphur Melts; (9) Miscellaneous Dyes; (10) Summary of the Most Important Methods: Sulphonations, Nitrations, Reductions, Oxidations, Alkali Fusions, Methods of Coupling.

III. Technical Details.—(11) Vacuum Distillations in the Laboratory and on the Works: Diphlegmation, Kubierschky Column, Raschig Column, Vacuum Pumps, Apparatus for the Distillation of Naphthols, Apparatus for Distillation Under Reduced Pressure in the Laboratory; (12) Notes Upon the Construction and Use of Autoclaves: Description of Autoclaves and Structural Material (material, liner, stuffing-box, safety-valve, thermometer, stirrer, etc.), Setting Up and Working, Methods of Heating, Laboratory Autoclave, Rotary Autoclaves, General Rules for the Use of Pressure Vessels, Pressure Curve for Aqueous Caustic Soda of Various Concentrations; (13) Structural Materials Used in Dye Chemistry: Metals, Non-Metals, Structural Materials of Organic Origin; (14) Technical Notes on Works Management: Significance of

the Dye Industry, Specialties and Mass Production, "Interessengemeinschaften" or "Rings," Arrangement of a Modern Color Factory, Organization, Works, Expenses, Steam Consumption, Utilization of Steam, Compressed Air and Vacuum, Duties of the Works Chemist, Manufacture, Standard Colors, Drying, Making Up to Type, Grinding, Mixing; (15) Example of Costing of a Simple Dye: Orange II, melt of sodium salt of B-naphthalene-monosulphonic acid, sulphanilic acid, B-naphthol.

IV. Analytical Section.—(16) Analytical Details: General, Preparation of Standards for Titration, Estimation of Amines, Naphthols, Dihydroxynaphthalene, Aminonaphthol Sulphonic Acids, Naphthol Sulphonic Acids, Dihydroxynaphthalene mono- and di-sulphonic acids, The Common Test Papers, Reagent Solutions for "Spotting" on Filter-Paper, Estimation of Zinc Dust and Lead Peroxide Paste.

Bleaching and Related Processes. J. Merritt Matthews, Ph.D. 676 pages, 300 illustrations. The Chemical Catalog Company, Inc., New York, 1921. Price $8.00 net.

Because of his extensive experience as a textile chemist, and particularly because he has specialized to a considerable extent as regards cotton bleaching, the author is especially well equipped to write an authoritative book upon this subject. Combining his own first-hand knowledge of the subject with the most reliable information and data to be obtained from the general literature, he has succeeded in bringing together in one volume the most comprehensive and exhaustive treatise upon this branch of textile chemistry that has thus far appeared in English, if not in any other language.

The arrangement of the text is such that one may find a continuous and complete discussion of the preliminary treatment and bleaching of the common textile fibers. As would naturally be expected from the relative importance of cotton bleaching, by far the larger portion of the book is devoted to this fiber. The last one hundred pages are devoted to the testing of the various chemicals and materials used in the processes described and will prove a valuable reference guide to chemists engaged in bleaching, scouring and finishing plants.

The subject matter is excellently illustrated, and while the writer specifically states in the preface that he has purposely omitted the dry details of mechanical description in regard to these illustrations, there are instances where a little more detail would have undoubtedly been of interest to seriously minded readers and students.

At the end there will be found an excellent bibliography and a comprehensive index.

The volume should form a valuable addition to the working library of every textile chemist and bleacher. —*Louis A. Olney, in Jour. Ind. & Eng. Chem.*

Foreign Trade Opportunities

Reserved information may be obtained from the U. S. Bureau of Foreign and Domestic Commerce and its district and co-operative offices by duly registered firms and individuals upon written request by opportunity number. The Bureau does not furnish credit ratings or assume responsibility as to the standing of foreign inquirers; the usual precautions should be taken in all cases, and where no references are offered it does not necessarily imply that satisfactory references could not be given. Correspondence may be in English unless otherwise stated. Symbols: *Reported by American consular officers; †Reported by commercial attaches and trade commissioners; ‡Direct inquiries received by the Bureau.

1249.*—A commercial agent in India desires to secure the representation of firms for the sale of 50 tons of concentrated Congo red; magenta crystals, green crystals, acid orange, and other aniline dyes; annealed wire, 16 gauge, packed in coils of one hundredweight; barbed wire, 12 gauge, 3 inches apart, 4 points, and 2-ply galvanized iron wire; bolts and nuts, hexagon head, round neck and hexagon nuts, size ½, ¾, ⅝, ⅞, and 1 inch, lengths from ½ to 14 inches, in lots of 10 tons minimum; and wood screws. Quotations should be given c. i. f. Indian port. References.

1257.*—The purchase is desired by a mercantile firm in India of caustic soda and sundries in wholesale quantities. Quotations should be given c. i. f. Karachi. Payment: Letter of credit against documents. Reference.

1297.*—A merchant in Spain desires to purchase mineral oils in large quantities, cotton nets for fishing, and tin in plates. Quotations requested c. i. f. Spanish port. Correspondence should be in Spanish. References.

1300.*—A commercial agent in Canada desires to secure the representation of firms for the sale of dry goods, haberdashery, novelties, specialties, etc. Reference.

1302.*—Inquiries have been received from firms in Spain desiring to purchase ship-chandlery goods, such as paints and varnishes, oils, ships hardware, cordage, rigging, wire rope, belting, packing, rubber goods, linoleum, ships' lights, safety lanterns, canvas, sailcloth, oars, boat hooks, log lines, and diving sets. Catalogues and quotations c. i. f. Spanish ports are requested. Correspondence should be in Spanish. References.

1303.*—A firm in New Zealand desires to secure an

agency from manufacturers for the sale of appliances and accessories pertaining to the clothing manufacturing industry, small hardware, fancy goods and novelties, and cigars. References.

1281.*—The purchase is desired by a mercantile firm in Spain of automobile accessories, cotton waste, belting of leather, balata, cotton, and camel hair, packings, rubber in sheets, and naval stores. Quotations should be given c. i. f. Sponish port. Correspondence requested in Spanish. References.

1282.†—A commercial agent from France is in the United States and desires to secue the representation of firms for the sale of raw cotton in the western European countries. Reference.

1321.*—Inquiries have been received from various firms in Spain for the purchase of articles of travel, haberdashery, razors, gloves, fancy goods, silk goods, perfumes, and glassware and novelties. Quotations are requested c. i. f. Spanish port. Correspondence should be in Spanish. References.

1330.*—An agency is desired by a firm in Brazil for the sale of hardware, tools, and dry goods, such as dress goods, shhirtings, suits, calicos, drills, and cambrics. Correspondence should be in Portuguese. References.

1108.*—An agency is desired by a merchant in France for the sale of cotton, rice, sugar, cocoa, coffee and dried and canned fruits. Quotations should be given f. o b. American ports or c. i. f. French ports. Terms: Cash against documents. Reference.

1112.‡—A manufacturer in Spain using large quantities of embroidery cotton in skeins now desires to purchase in the United States, and requests quotations from American firms. Reference.

1126.‡—An American firm having a traveling representative in Brazil and Uruguay desires to secure the representation of firms for the sale of mercerized cotton yarn and silk yarn for the manufacture of hosiery; leather, shoemakers' supplies, electrical goods, hardware, and notions such as leather belts, garters, suspenders, arm bands, snap fasteners, pins, and hooks and eyes. References.

SCHLAKE DYE WORKS WILL BE LARGEST IN MIDDLE WEST

The Middle West has its first large dye and finishing works now that the Schlake Dye Works at 4205-5219 West Grand Avenue, Chicago, is completed and rapidly getting into operation. This concern has been for several years operated under the management of Theodore H. Schlake, 1221 North Oakley Boulevard, that city, dyeing all grades of yarn—silk, cotton, wool, worsted and merino for knitters and weavers. The great Middle West section of which Chicago is the center has been, of late years, acquiring a large portion of the increase in textile manufacturing industry and many plants that only a few years ago were small have expanded into large proportions and many medium-sized plants have been installed and all are apparently running with marked success making high-grade products, providing an ever-increasing demand for dyeing and finishing; this accounts for the expansion of the Schlake Dye Works operations and the consequent necessity for increased facilities for turning out better work and more of it. The new plant includes machinery and apparatus for the bleaching and dyeing of skein yarns, hosiery dyeing, finished products dyeing and silk weighting. Machinery and equipment has already been purchased Work on the building started not long since and will cover 25,000 square feet, measuring 200 feet on Grand avenue and 125 feet deep, costing approximately $250,000. This plant, the buildings of which are constructed of brick, will employ, at the start, 50 employees with provisions made for increasing the output.

N. C. TEXTILE SCHOOL STUDENTS HEAR ADDRESSES

At the last meeting of the Tompkins Textile Society, which is composed of students taking the textile course at the North Carolina State College, an address was delivered by S. W. Jen. on the subject, "Textile Manufacturing in China." Mr. Jen is from Shanghai, having previously graduated from a textile school in that city. He is now taking an advanced textile course in the textile department of the North Carolina State College, which is the textile school of North Carolina, and will graduate at the end of the present school year, when he expects to return to China to enter textile manufacturing.

At the meetings of this society various members take part and discuss different phases of textile manufacturing and allied industries, in which they are assisted by the faculty of the department. W. I. Pickens, who will also graduate in May, addressed the society on the subject of "Commission Houses and Their Relation to the Textile Trade."

Professor Nelson, who has charge of the Textile Department, addressed the meeting, taking for his subject, "How to Advance in the Textile Industry After Graduation."

FARADAY AND DYES

"Faraday discovered benzene, or, as he then termed it, bicarburet of hydrogen, among the products of the condensed oil-gas manufactured by the Portable Gas Company. Faraday may thus be said to have laid the foundation of that immense industry which recent discoveries in chemistry have so rapidly developed—the manufacture of the so-called aniline dyes."—Thorpe's Essays in Historical Chemistry.

MEN OF MARK
in the
DYESTUFF FIELD

WALTER M. SCOTT
Chief Chemist
Cheny Brothers
South Manchester, Conn.

WALTER MOODY SCOTT was, as he himself phrases it, "born and raised a Connecticut Yankee." On completing his common and preparatory school education he entered the Sheffield Scientific School of Yale University, from which he graduated in 1912 with the degree of Ph.B. During his senior year at that institution he was elected to membership in the honorary society of Sigma Xi.

For the next three years he elected to pursue graduate studies at Yale, specializing in organic chemistry. During this period he also acted as Assistant Instructor in the chemical laboratory, and in 1915 he received the degree of Ph.D.

With the exception of about one year of service in the army as a lieutenant in the Sanitary Corps, his connection with Cheny Brothers dates continuously from 1915 to the present time. He occupies the position of chief chemist to this silk manufacturing firm, being in charge of the laboratory and also of the purchase of dyestuffs and chemicals for use in the plant.

He is an active member of the American Association of Textile Chemists and Colorists, of which he is one of the Councillors, and likewise takes an active interest in the work of the Research Committee of this organization. He is a member of the American Chemical Society, and of the Chemists' Club of New York.

Incidentally, Dr. Scott takes a lively interest in lawn tennis, and acts as official representative of the Manchester Country Club to the U. S. Lawn Tennis Association. He is willing, he informs us, to challenge any textile chemist to a match for supremacy in this sport.

THINGS EVERY TEXTILE CHEMIST AND COLORIST SHOULD KNOW

No. 4—Reclaimed and Extracted Animal Fibers

(*Concluded from page* 294.)

uniform color. Shoddy of this type can be extensively used in the manufacture of comparatively high-grade woolen cloth when properly blended with high grade virgin wools. Goods can be manufactured containing as high as 95 per cent of a high-grade shoddy and present a very respectable appearance, and also possess fair wearing qualities, but this percentage, of course, is not recommended.

Mungo

Mungo is the term applied to fibers reclaimed from milled or felted rags, the individual fibers being more or less tightly attached to each other. In this type of fabric considerable resistance is offered when the fibers are torn apart. As a result the fibers become ruptured and injured and mungo is therefore of lower grade than the shoddy prepared from unfelted fabrics.

Extracted Wool

Extracted wool results from the carbonization of rags and textile material composed of cotton and wool fibers. The carbonization process completely destroys the cotton and any other vegetable fibers that may be present, leaving the wool unchanged. The term extracted wool therefore applies to the source, and has no specific bearing upon the quality of the product. The value of extracted wool therefore will depend very largely upon its source. For instance, fibers reclaimed from a fabric consisting of a cotton warp with a woolen yarn for filling, or a low-grade woolen which was originally made by carding cotton and perhaps low-grade wool and some shoddy together, will correspond to a medium or low-grade mungo.

In the manufacture of very low-grade shoddies it is sometimes the case that no attempt is made to extract the cotton which, in the original fabric, was carded with the wool.

Detection and Estimation of Shoddy

The satisfactory detection of shoddy in a fabric is a difficult matter. There is no chemical process that can be used for obtaining a separation of wool and shoddy, because chemically shoddy and wool are of the same composition. The microscope is the only means, and this on the whole is very unsatisfactory. Any method of detection is based upon the fact that the fibers become more or less injured and ruptured during the manufacture of the reclaimed wool and in some instances a partial but decidedly unreliable separation can be made. It must be borne in mind that the process of tearing a woolen fabric apart for examination is in reality a modification of the process of making shoddy; therefore fibers torn from a felted fabric though originally made entirely of new wool might readily give the characteristic appearance of shoddy.

For these reasons, no accurate determination of the percentage of shoddy in a fabric can be made and any examination with the microscope can only result in an estimation, with wide limit of error.

Recent Patents

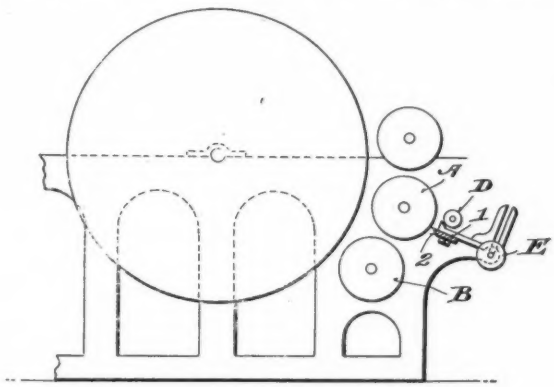
Carding or Straightening the Fibers of Cotton

(1,406,474; February 14, 1922)

Daniel E. Molloy, Fall River, Mass.

This relates to certain new and useful improvements in carding or straightening the fiber of cotton, and relates especially to what are known as revolving flat cards used in the textile art for carding or straightening the fiber of cotton.

The primary object of the invention is to provide means which will act upon the cotton passing into the machine under the feed roll so as to cause the fibers to be straightened by what is commonly termed the licker-in.



A further object of the invention is to provide means of the type mentioned which is adjustable, and which will operate effectively and with certainty to function as above described.

Briefly, the invention resides in the employment of a bar or the like having a sharp or knife edge which is adjusted to such point that the cotton passing into the machine under the feed roll will be drawn across the sharp edge of the metal bar or knife and thereby cause the fibers to be straightened by the licker-in as the latter draws the cotton over the knife edge.

The drawing is a fragmentary side elevation, partly in section, showing the invention in position on a carding machine.

In proceeding in accordance with the present inven-

tion it will be understood that the rolls depicted in the drawing are in practice supplied with the usual card cloth, and that the machine itself is otherwise of the usual structure employed in the cotton mills.

Accordingly it will be understood that the roll of cotton known as the lap is supported on the lap roll E and passes under the feed roll D to what is commonly termed the licker-in, the latter being designated A in the drawings. From the licker-in the cotton is carried downward and over the roll B, the latter acting to remove the short fibers carried into the machine by the licker-in A, and the cotton is then stripped from the roll B permitting it to pass to the main cylinder C, from which latter it is stripped and operated upon by the various flats until it finally reaches the opposite end of the machine, where it is doffed or removed from the main cylinder and passes out of the machine.

The present invention particularly resides in the use and combination with certain of the above parts to be described, of an elongated bar 1 which is beveled along one edge to form a cutter or knife 2. This bar may have slots through which bolts pass to rigidly secure same to the usual feed table, the bar being preferably disposed beneath the table. The knife edge is disposed adjacent to the periphery of the licker-in, and can be adjusted toward and away from same as is obvious by means of the bolts and slots, the adjustment being such that the cotton passing into the machine under the feed roll D will be drawn across the sharp edge to straighten the fibers.

In operation the roll of cotton is supported on the lap roll E and passes under the feed roll D, and is then drawn by the licker-in A across the sharp edge of the bar or knife, so that its fibers will be straightened, following which the cotton is carried downward over the roll B, whereupon the latter removing the short fleece from the licker-in whereupon the cotton passes to the main cylinder, from which latter it is stripped and operated upon by the various flats until it finally reaches the opposite end of the machine where it is stripped or removed from the main cylinder and passes out of the machine.

Manufacture of Artificial Goods from Viscose

(1,407,696; February 28, 1922)

Max Luft, Boras, Sweden

This invention relates to the manufacture of artificial fabrics, filaments, films and the like articles from viscose (cellulose-xanthate) and has for its object to render the manufacture more expeditious and produce a cellulose which is of uniform character, consistency, luster and feel.

The manufacture of filaments, films, plates and the like from viscose, which forms an unstable solution, depends upon several conditions; as, for instance, upon the state of maturation of the viscose, upon the several by-products and the partly gaseous objectionable products of decomposition of the xanthate. These conditions are practically for the most part not controllable and cause great losses of material and affect the luster, the strength and the uniformity of the formed cellulose-hydrates.

Inventor has found that the acids of the naphthenes or the aqueous solutions of their salts added to the solution of xanthate have a surprisingly favorable effect, as they bind the sulphur by-products and the impurities of the viscose, improve the uniformity and durability of the solution and render the precipitation or separation of the cellulose-hydrates uniform and independent from the state of maturation of the raw viscose used. The raw viscose treated with acids of the naphthenes gives by the precipitation in acids or salt solutions goods of an improved quality.

The acids of the naphthenes (the carboxyl derivatives of the naphthenes or the polymethylenes) are to be found in large quantities in petroleum (naphtha) and are obtained as waste products from the distillation of petroleum in the form of alkaline salts of the naphthenes. Their affinity for sulphur and for sulphides is—according to Renouard "Les matieres grasses" 1919—so intensive that they are capable to devulcanize the caoutchouc and may be used for the regeneration of the same.

It has been found that in the alkaline solutions of viscose the acids of the naphthenes bind the sulphides, thiocarbonates and other impurities containing sulphur without influencing in any way the xanthate. The viscose does not coagulate and the solutions remain homogeneous. They may be used without further treatment for the manufacture of the artificial goods; for instance, they may be spun in acid solutions of salts. The acid of the naphthenes freed from the threads during the spinning process continues to act in the spinning bath and hinders the adverse reactions of the sulphides taking place under ordinary circumstances. The resulting products are smooth and uniform in luster and softness as well as in strength and elasticity.

To carry out this process, the liquid acid of naphthenes, which ought to be free from resin, or preferably the aqueous or alkaline solutions of the salt of the acid, is allowed to flow in and is uniformly mixed with the common alkaline solution of the xanthate. The waste solutions of the petroleum factories represents such an alkaline solution. The acid of naphthenes or its salts may be added to the finished solution of the viscose or to the alkaline water with which the viscose is stirred and diluted.

The quantity of the free acid of naphthenes used depends upon the quantity of CS_2 required for the formation of the xanthate and is about 5 per cent of the latter quantity. The acids of the naphthenes and their sulphur compounds may be separated from the baths in the usual manner, recovered and used again, which renders the process much cheaper. The resulting artificial goods are thereupon washed and treated in the common way.

Manufacture of Resorcinol

(1,406,745; February 14, 1922)

HARRY MCCORMACK, Chicago, Ill.

This relates to the manufacture of resorcinol; and it relates more particularly to a process of preparing resorcinol from benzene disulphonic acid, wherein benzene disulphonic acid, usually in the form of a salt thereof, is reacted upon with caustic alkali, specifically sodium hydroxid or caustic soda, to form the corresponding alkali metal resorcinate, which latter is then treated with the proper amount of mineral acid to set free resorcinol in admixture with an alkali metal salt or salts, such as sodium sulphate and sodium sulphite, said salts being separated in large measure, from the resorcinol in the mixture by systematic crystallization, and the separation of the resorcinol from the residual salts still remaining admixed therewith after crystallization being then effected either with the aid of a selective solvent for resorcinol, employed in much smaller quantity than has been indispensable heretofore, or by another procedure by which the use of the selective solvent may be dispensed with altogether.

In the commercial manufacture of resorcinol as heretofore practised, benzene disulphonic acid, or more commonly the sodium salt thereof prepared in a well known manner, is heated with with an excess of caustic soda (sodium hydroxid), the resultant reaction mixture containing sodium resorcinate, sodium sulphite and some unchanged sodium hydroxid. The mixture is then dissolved in a large amount of hot water, and the solution is treated with the requisite amount of a mineral acid, sulphuric acid being commonly employed, or sometimes hydrochloric acid. After the addition of acid, the solution is boiled to drive off sulphurous acid, and after cooling, the solution is filtered to remove tarry matter, and the filtrate is extracted with ether or with some other solvent which is immiscible with water and which is a selective solvent for resorcinol. The etheric solution of resorcinol is then evaporated, yielding crude resorcinol which may be further purified in various ways.

The known commercial method above described for the manufacture of resorcinal requires the use of a very large quantity of immiscible solvent in order to secure a reasonably complete extraction of resorcinol from the water solution. This is because resorcinol is more soluble in water than in said solvent. The necessity for employing such large quantities of solvent increases the technical difficulties of manufacture, and it is a substantial factor in the cost of the final product.

It is a principal object of the present invention to so alter the customary practice heretofore prevailing as to greatly reduce the amount of selective solvent required for separation of resorcinol from the salts necessarily occurring in admixture therewith at certain usages of its manufacture from benzene disulphonic acid; or optionally to eliminate the use of such selective solvent altogether. A further and general object is to simplify and cheapen the manufacture of resorcinol by certain novel steps to be explained hereinafter.

In general, the objects of the invention are attained by working with aqueous solutions of resorcinol-containing mixtures of such concentration, that crystallization of the alkali metal salt or salts present may be made to occur as the solutions cool from an initial heated condition. Resorcinol being much more soluble in water than are the alkali salts involved, specifically sodium sulphite and sodium sulphate, it is possible to crystallize large and even major proportions of the salts without accompanying perceptible crystallization of resorcinol. The crystallized salt or salts having been removed from the cooled solution in any suitable manner, the residual concentrated solution of resorcinol still containing a comparatively small amount of admixed salt or salts, may then be evaporated to substantial dryness at a low temperature, under diminished pressure if desired. From the dry residue of mixed resorcinol and salts, resorcinol may be dissolved out by means of a selective solvent for resorcinol, such as benzol, ether, ethyl alcohol, amyl alcohol, or any other solvent which will dissolve resorcinol and which will dissolve resorcinol and which will not dissolve the admixed salt or salts to any substantial extent. It will be noted that by proceeding in this manner, the number of selective solvents possible to employ is comparatively large, since it is not necessary that the solvent be immiscible with water as was the case in customary practice prevailing heretofore. Moreover, only a comparatively small amount of the solvent is necessary to effect substantially complete extraction of the resorcinol from the dry mass treated.

In an alternative procedure, the dry mixture of resorcinol and alkali metal salt or salts can be heated in vacuo to distill off resorcinol, this procedure avoiding the use of any selective solvent.

In the present process, benzene monosulphonic acid is first prepared by the sulphonation of benzol with fuming sulphuric acid which may be made up to a strength of 20 per cent SO_3. The sulphonation is carried out by heating the sulphonation kettle with steam and maintaining the temperature of the reaction mixture at around 70 deg. Cent. until the sulphonation to monosulphonic acid is complete. This mixture is then transferred to a jacketed oil-heated pan, the temperature of sulphonation being raised gradually to about 225 deg. Cent. or somewhat higher, at which point the sulphonation to benzene disulphonic acid is complete The excess sulphuric acid is then neutralized with lime, calcium sulphate is filtered off, and the calcium benzene disulphonate is changed to sodium benzene disulphonate by the addition of sodum carbonate; after which, the precipitated calcium carbonate is filtered out and the solution of sodium benzene disulphonate is evaporated to crystallization. Solid sodium hydroxid is melted in a cast iron pan provided with a stirrer and to the molten sodium hydroxid is gradually added the proper quantity of sodium benzene disulphonate. While the proportions may be varied in practice, it has

been found desirable to use the reagents in the proportion of 250 kilograms of sodium hydroxid to 125 kilograms of dry sodium benzene disulphonate. The mixture is heated at a temperature of 315 deg. Cent. for approximately two hours, at the end of which time the reaction is complete. In the resultant melt are present sodium resorcinate, sodium sulphite, and some unchanged sodium hydroxid.

In practising the process of the present invention, the melt obtained as above described is dissolved in hot water to obtain a concentrated solution from which sodium sulphite will crystallize as the solution cools. In practice, using the weights of sodium hydroxid and sodium benzene disulphonate given in the above specific example, the addition of 600 liters of boiling hot water to the reaction melt has given satisfactory results although it is not intended to limit the practice of the invention to the use of this particular proportion of water. The solution thus obtained is cooled either artificially or by allowing it to cool spontaneously, until the major portion of the contained sodium sulphite has crystallized out. The solution may be separated from the crystals in any suitable manner as by decantation, centrifuging, or other means; and the separated solution consisting mainly of sodium resorcinate and sodium hydroxid is neutralized by adding cautiously the requisite amount of sulphuric acid preferably at about 60 deg. Baume. This results in formation of sodium sulphate and resorcinol. The solution which is hot when the neutralizing action is completed, is then cooled until the major portion of the sodium sulphate crystallizes out, the crystals being removed by decantation, filtration, or centrifuging. The residual solution, which contains a mixture of resorcinol with the comparatively small amount of sodium sulphate that did not crystallize out, and usually containing also some sodium sulphite, is evaporated at low temperature to substantial dryness, employing diminished pressure if desired. The resultant dry powder, consisting chiefly of resorcinol mixed with sodium sulphate, may then be treated for separation of resorcinol in either of two ways, in accordance with the invention. Said dry powder may be extracted with a suitable solvent, such as any of those above mentioned or mixtures of two or more of such solvents, in which the resorcinol is soluble and sodium sulphate and sodium sulphite are substantially insoluble; the solution of resorcinol resulting from the extraction being then evaporated to recover resorcinol, and the solvent also being recovered for re-use. The resorcinol thus obtained may be further purified in known manner by distillation in vacuo. Or, where it is desired to dispense with the use of a solvent altogether, the aforesaid dry powder may be heated in vacuo, resorcinol distilling off, and the admixed sodium sulphate and sodium sulphite (if any) being left as a residue in the still.

Machine for Spinning, Washing and Dyeing Viscose Threads

(1,408,350: February 28, 1922)

Maurice Denis, Paris, France

This invention relates to the manufacture of artificial silk by the viscose process, and has for its object to provide an improved machine for simultaneously spinning, washing and drying the viscose thread in a continuous manner; this machine is of the kind in which the viscose thread, on issuing from each of the squirting nozzles, plunges directly, within a container, having the shape of a test-tube, and surrounding the nozzle, into a coagulation bath traveling, along a closed circuit, in the same direction as the viscose thread.

According to the present invention, the test tube containing the coagulation bath is adjustable vertically with respect to the squirting nozzle, so as to allow of regulating the length of travel of the viscose thread in the coagulation bath, which is an important condition in order to obtain a good coagulation of the thread.

Said arrangement also allows the workmen to collect easily the filaments issuing from the squirting nozzles at the beginning of the manufacture, or to clean, open or replace easily and readily a squirting nozzle, if required.

The accompanying drawing is a vertical cross-section of the improved machine.

The liquid constituting the coagulating bath is brought in the required conditions of temperature, concentration and volume, from the general supply conduit 18 into the lower part of each container 15. It fills this container until the level of the overflow 16 is reached, and it then overflows through the pipes 17 and 22 into the collector 23, whence it is returned, after having been purified, regenerated and reheated, to the feed conduit 18. The flow of the coagulating liquid is regulated by the cock 20, according to the velocity of the issuing filament.

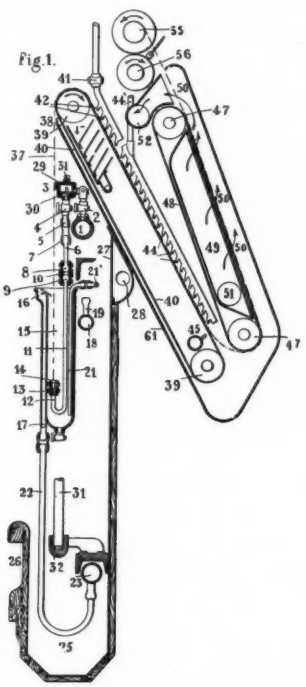
The coagulating bath, in flowing through the coagulating container 15 in the direction of the travel of the viscose thread thus makes a closed circuit, in the course of which it become purified, regenerated and made ready for reuse according to the desired temperature.

The solution of viscose, supplied by the pipe 1 in the requisite conditions of concentration, temperature and pressure, is purified in the filter box 5 of the filtering group A or B (according as one or the other of these groups is in operation) and passes through the union 6, the pipe 11—12, and the nozzle 13 carrying the squirting nozzle 14, and squirts into the coagulating bath contained in the container 15.

When it is required to open, clean or replace a squirting nozzle 14, or to collect the filaments at the commencement of the manufacture, the container 15 is lowered so as to leave above the upper level of the nozzle 14 only the minimum height necessary for the coagulation of the filament, and allow the hand labor

of the workmen charged with collecting the first thread to be performed under the best conditions.

For this purpose the glass container 15 is carried by two aluminum collars 35, 36, sliding along guide pillars 31 of aluminum of glass supported by collars or sleeves 33 on the conduit 18. The devices provided for supplying and discharging the coagulating liquid are such that this container 15 can be lowered without the liquid contained therein overflowing therefrom. It can also be kept in a determined position for regulating the length of filament submerged according to the velocity of travel of said filament and therefore regulating the



length of the sojourn of the jet of viscose which is squirted into this medium.

As soon as the thread 37 issuing from the squirting nozzles 14 has been delivered to the drawing devices 38, the container 15 is brought into a position satisfying the conditions for the sojourn of the thread in the medium of the coagulating bath.

The resulting injurious vapors are sucked through a perforated plate 27 by a pipe 28 connected to any suitable suction apparatus.

The thread 37, produced by the union of the filaments issuing from the several orifices of a squirting nozzle 14, is attached in passing to one of the hooks 38 carried by the endless metal web 40, and is drawn along by the latter at a determined speed. The lengths of the metal webs 40 and 48 are determined according to the requirements ascertained by experiment in relation to the coagulation and the complete washing and drying of the viscose thread.

If the first coagulating bath contained in the container 15 has had an insufficient effect upon the viscose thread, the nozzles 42 may spray the thread, as it travels along with the endless web 40 for a determined length and number, with a liquid suitable for completing the coagulation. This liquid will in part be collected by the trough device 43 for the purpose of subsequent regeneration.

The nozzles 44 will likewise suitably wash the coagulated thread under suitable conditions of space and duration. The jet of the inner nozzles 45 will unstick the thread from the metal web 40 and will facilitate the transference from this web 40 on to the endless web 48 upon which it will be dried by the action of a current of hot air supplied through the pipe 51 in the casing 49. The thread is then wound on the bobbin 55.

Textile Drying Machine

(1,407,081; February 21, 1922)

BERTRAND A. PARKES (assignor to the Philadelphia Drying Machinery Company, Philadelphia, Pa.)

This relates to drying machines employed in drying textile materials and is more especially directed to machines of the above character adapted for drying materials of great length, such as warp yarns, etc. The aim is to so arrange and support the materials, during their traverse through the drying chamber of the machine, as to attain a maximum capacity, with a corresponding increase in efficiency of operation.

The preferred embodiment of the invention includes a feeding mechanism, whereby a series of festoon loops are formed lengthwise and in succession upon supporting bars or poles of an endless conveyor, which is intermittent in its operation. As the supporting bars of the conveyor are brought to the feeding position, an intermittently oscillating feed directs the material in succession on alternate sides of the bars, with resultant formation of the festoon loops; and contemporaneously with this action, a distributing guide determines the pitch or spacing of the loops. Means are also provided for controlling the action of the feeding mechanism so as to form connecting loops between successive conveyor bars and render the operation continuous.

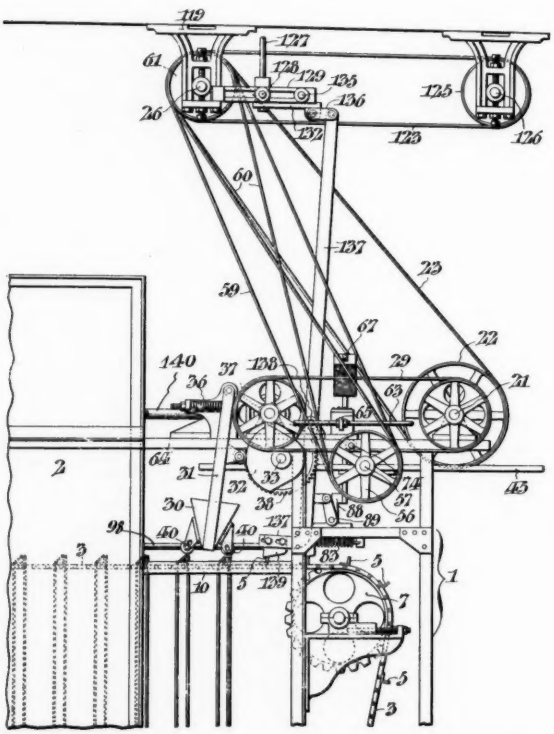
The drawing is an elevation of the receiving end of a drying machine embodying the invention, showing, in addition, the overhead driving means for the feed.

The drying machine illustrated is of well known construction, and may be briefly described as follows:

The framework of the machine consists of a structural iron skeleton, which serves in part to support a series of sheet iron panels forming a rectangular enclosure ordinarily termed a drying chamber. In practice, this chamber is heated by any suitable means such as steam coils, and the heated air within is constantly circulated by suitable fans not shown. Said chamber is traversed by an intermittently operating

conveyor consisting of two spaced endless sprocket chains, to which are attached the lateral supporting bars, preferably of angle iron. These bars are adapted for supporting in festoons, the material to be dried. The chains are driven by sprockets fixed upon a shaft and their circuit is otherwise determined by idler sprockets. In traveling along the active portions of their circuits, these chains are further supported by guides, whereby undue sagging under load is prevented.

The conveyor is driven by means of a ratchet wheel fixed upon the shaft, and actuated by a pawl, carried by a swinging arm, loosely fulcrumed about said shaft. The outer end of the arm, s coupled by means of a connecting rod, with a crank disk, fixed upon a counter



shaft, which is journaled in suitable bearings, supported by an out-structure forming part of the skeleton of the machine. This shaft is constantly rotated by power transmitted from any convenient source to a sprocket wheel thereon. The pawling of the ratchet wheel is governed by a controlling mechanism.

Claims are granted as follows:

1. A drying machine comprising a traveling conveyor with a plurality of transverse supporting bars, and means for festooning the material to be dried successively on said bars in a plurality of loops arranged lengthwise of each bar, including a guide moving back and forth transversely of the conveyor and means for reversing the movement of said guide controlled by its progress in each direction.

2. A drying machine comprising a traveling conveyor with a plurality of transverse supporting bars, and means for festooning the material to be dried successively on said bars in a plurality of loops arranged lengthwise of each bar, including a guide moving back and forth transversely of the conveyor and means for reversing the movement of said guide controlled by its progress in each direction and by the movement of the conveyor.

3. A drying machine comprising a traveling conveyor with a plurality of transverse supporting bars; means for festooning the material to be dried successively on said bars in a plurality of loops arranged lengthwise of each bar, including a guide moving back and forth transversely of the conveyor; and means controlled by the back and forth movement of said guide for producing movement of the conveyor.

4. A drying machine comprising a traveling conveyor with a plurality of transverse supporting bars; means for festooning the material to be dried successively on said bars in a plurality of loops arranged lengthwise of each bar, including a guide moving back and forth transversely of the conveyor and means for reversing the movement of said guide controlled by its progress in each direction; and means controlled by said reversing means for producing movement of the conveyor.

5. A drying machine comprising a traveling conveyor with a plurality of transverse supporting bars; means for festooning the material to be dried successively on said bars in a plurality of loops arranged lengthwise of each bar; and the means controlled by movement of the conveyor for feeding the material to said festooning means.

6. A drying machine comprising an intermittently advancing conveyor with a plurality of transverse supporting bars; means for festooning the material to be dried successively on said bars in a plurality of loops arranged lengthwise of each bar, and means for feeding the material to said festooning means while the conveyor is at rest and interrupting such feed during its periods of motion.

7. A drying machine comprising an intermittently advancing conveyor with a plurality of transverse supporting bars; means for festooning the material to be dried successively on said bars in a plurality of loops arranged lengthwise of each bar, including a guide movable back and forth transversely of the conveyor; means for moving said guide transversely while the conveyor is at rest and interrupting its movement while the conveyor is in motion; and means for feeding the material to said festooning means while the conveyor is at rest and interrupting such feed during its periods of motion.

8. A drying machine comprising a traveling conveyor with a plurality of transverse supporting bars; means for festooning the material to be dried successively on said bars in a plurality of loops arranged lengthwise of each bar including a guide movable back and forth transversely of the conveyor; means con-

trolled by the back and forth movement of said guide for producing movement of the conveyor, and by movement of the conveyor for producing back and forth movement of said guide; and means controlled by movement of the conveyor for feeding the material to said festooning means.

9. A drying machine comprising an intermittently advancing conveyor with a plurality of transverse supporting bars; means for festooning the material to be dried successively on said bars in a plurality of loops arranged lengthwise of each bar, including a guide moving back and forth transversely of the conveyor; means for producing movement of the conveyor and for reversing the movement of said guide actuated as a result of progress of the latter in each direction; and means for rendering said reversing means ineffective during movement of the conveyor.

10. A machine of the class described, including a drying chamber; a conveyor traversing said drying chamber; a series of transverse supporting bars carried by said conveyor; means for feeding the materials to be dried, including a guide operative longitudinally with respect to the conveyor bars; and a feed screw for actuating said distributing guide.

11. A machine of the class described, including a drying chamber; a conveyor traversing said drying chamber; a series of transverse supporting bars carried by said conveyor; means for feeding and distributing the materials to be dried, including a guide operative longitudinally with respect to the conveyor bars and a feed screw for actuating said distributing guide and a drive for the said screw automatically reversible under the control of the distributing feed

12. A machine of the class described, including a drying chamber; a conveyor traversing said drying chamber; a series of transverse supporting bars carried by said conveyor; means for feeding and distributing the materials to be dried, including a guide operative longitudinally with respect to the conveyor bars and a feed screw for actuating said distributing guide; a reversible drive for the said distributing feed, including tight and loose pulleys associated with said screw; and open and crossed driving belts, and shifting means for automatically interchanging said belts in alternation upon said tight pulley under the control of said distributing guide.

13. A machine of the class described, including a drying chamber; a conveyor traversing said drying chamber; a series of transverse supporting bars carried by said conveyor; means for feeding and distributing the materials to be dried, including a guide operative longitudinally with respect to the conveyor bars and a feed screw for actuating said distributing guide; a reversible drive for the said distributing feed, including tight and loose pulleys associated with said screw; open and crossed driving belts and a shifting bar for interchanging said belts on the tight pulley; a pivoted lever for actuating said shifter, said lever having a weighted and capable of automatically swinging to opposite sides of the pivot after being set in a position slightly beyond the neutral in either direction; and means automatically controlled by the distributing guide for setting said weighted lever

14. A machine of the class described, including a drying chamber; a conveyor traversing said drying chamber; a series of transverse supporting bars carried by said conveyor; means for feeding and distributing the materials to be dried, including a guide operative longitudinally with respect to the conveyor bars and a feed screw for actuating said distributing guide; a reversible drive for the said distributing feed, including tight and loose pulleys associated with said screw; open and crossed driving belts, and a shifting bar for interchanging said belts on the tight pulley; a pivoted lever for actuating said shifter, said lever having a weighted end capable of automatically swinging to opposite sides of the pivot after being set in a position slightly beyond the neutral in either direction; means automatically controlled by the distributing guide for setting said weighted lever; and means controlled by the conveyor for temporarily restraining the action of the weighted lever to prevent the shifting of the said belts during the progression of the conveyor.

19. A machine of the class described, including a drying chamber; an intermittently operative conveyor traversing said drying chamber; a series of transverse supporting bars carried by said conveyor; devices for feeding the materials to be dried; driving means for said feeding devices, including a shaft having tight and loose pulleys, a driving belt for said pulleys; a belt shifter; and an operating lever for said shifter lying in the path of the conveyor bars and co-operating with them to cause the belt to be shifted to the idle pulley to render the feeding devices inoperative during the motion of the conveyor.

20. A machine of the class described, including a drying chamber; an intermittently operative conveyor traversing said drying chamber; a series of transverse supporting bars carried by said conveyor; a reciprocating guide for feeding the materials longitudinally to the conveyor bars; driving means for the conveyor comprising a ratchet wheel, a continuously oscillating arm, and a pawl carried by said arm and normally inactive upon said ratchet; and means actuated by the reciprocating feed at the end of its travel in either direction for rendering the pawl of the conveyor drive active.

21. A machine of the class described, including a drying chamber; an intermittently operative conveyor traversing said drying chamber; a series of transverse supporting bars carried by said conveyor; a reciprocating guide for feeding the materials longitudinally to the conveyor bars; driving means for the conveyor comprising a ratchet wheel, a continuously oscillating arm, and a pivoted pawl carried by said arm and having a weighted extension normally maintaining said pawl in inactive position; a stop for engaging the

weighted extension of the pawl; a cam for shifting said stop into the path of the weighted arm of the pawl; and means actuated by the said reciprocating guide at the end of its travel in either direction for controlling said cam to eect the pawling of the latter.

22. A machine of the class described, including a drying chamber; a conveyor traversing said drying chamber; a series of transverse supporting bars carried by the said conveyor; means for intermittently driving said conveyor; a feed for the material to be dried; a reciprocating guide for distributing the material longitudinally of the conveyor bars while directed thereto by the feed; driving means common to the feed and the distributing guide; and means controlled by the conveyor for rendering the said common driving means for the feed and the guide idle during the progression of the conveyor.

Foreign Dyes Licensed by Treasury Department for March Import

Total Is 45,654 Pounds Less than February's; Germany and England Off Slightly; France Sends First Shipment Since Last October; Switzerland Gains

LICENSED imports of dyestuffs for March, which totaled 254,615 pounds, showed a falling off from the February importations, which were but 300,269 pounds. This is likewise a loss from the 308,787 December total.

Germany, leader for the month, undershot her February mark of 161,012 pounds by sending us 134,784 pounds in March. England showed the greatest percentage decrease by falling all the way from 25,500 pounds in February to but 3,650 pounds in March. France, on the other hand, came back into the field with a contribution of 1,625 pounds—the first she has sent here since October, when 880 pounds was the total. Switzerland recorded a not too substantial gain by increasing her February total of 113,757 pounds to 114,556 pounds.

Following is the complete list, giving the types and quantities of dyestuffs for the importation of which into the United States licenses were granted by the Treasury Department, Division of Customs, Dye and Chemical Section, during March. The tabulation is being issued by the American Dyes Institute, and it is announced that anyone interested in the manufacture of dyestuffs who has not received a copy may obtain one by application to that organization's headquarters, 320 Broadway, New York City.

An appended note by the Treasury Department states: "Licenses shown by this list to have been issued for particular commodities must not be considered as a precedent or assurance that favorable action will be taken on future applications for similar commodities. The Treasury Department, Dye and Chemical Section, announces in special cases that it is its practice to consider any special evidence that may be submitted by manufacturing consumers of dyestuffs tending to prove that the American commodity, while satisfactory in general or for some lines, will not meet the requirements as to quality or adaptability for particular manufacturing purposes."

Designation of Dye	Germany (lbs.)	Switz. (lbs.)
Aceto Purpurine 8B	1,200	....
Acid Alizarine Gray G	739	....
Acid Anthracene Brown RH Ex. Pdr.	500	....
Acid Chrome Blue 2R	10	....
Acid Cyanine BF	500	....
Acid Green B Conc	9	....
Acid Rhodamine BG	200	....
Acid Rhodamine R	....	660
Acid Rhodamine 3R	....	660
Acid Violet BW	300	....
Acid Violet N	100	....
Acridine Red B	25	....
Acridine Red 3B	25	....
Acridine Orange GG	25	....
Acridine Orange NO	25	....
Acridine Scarlet R	25	....
Acridine Scarlet 3R	25	....
Acridine Yellow G	25	....
Acridine Yellow R	25	....
Algol Brilliant Red 2B Paste	200	....
Algol Brilliant Violet 2B Powder	30	....
Algol Brilliant Violet R Paste	300	....
Algol Brown G	130	....
Algol Brown R Paste	286	....
Algol Brown R 12½% Paste	25	....
Algol Olive R Powder	50	....
Algol Red B	2,000	....
Algol Red FF Extra Paste	200	....
Alizarine Astrol B	650	....
Alizarine Black T	45	....
Alizarine Blue S	3,000	....
Alizarine Blue SAE	300	....
Alizarine Blue SAP	72	....
Alizarine Blue SB 45% Conc. 50	390	....
Alizarine Blue SKY	575	....
Alizarine Blue SW Powder	5	....
Alizarine Blue Black B	2,700	....
Alizarine Blue Black 3B Powder	1,000	....
Alizarine Blue Black BT Powder	500	....
Alizarine Bordeaux BD or GG	45	....
Alizarine Cyanine GG Powder	1,000	....
Alizarine Cyanine Green G Ex. Pdr.	530	....
Alizarine Cyanine Green G Extra	25	....
Alizarine Direct Blue B	100	....
Alizarine Fast Gray 2BL	35	....
Alizarine Geranole B	25	....
Alizarine Irisol R	650	....
Alizarine Light Blue SE	....	1,100
Alizarine Orange AO 20% Paste (from England 1,800 lbs.)	....	....

Designation of Dye	Germany (lbs.)	Switz. (lbs.)
Alizarine Orange R Powder	50	....
Alizarine Red Yellow Shade	200	....
Alizarine Red S Powder	1,720	....
Alizarine Red SX 20% Paste	5,000	....
Alizarine Red W Powder	750	....
Alizarine Rubinole 3G	10	....
Alizarine Rubinole R	5,485	....
Alizarine Rubinole GW Powder	5,900	....
Alizarine Saphirol B	1,600	....
Alizarine Saphirole SE Powder	1,000	....
Alizarine Saphirole SE Conc	225	....
Alizarine Saphirole WSA Powder	1,000	....
Alizarine Sky Blue B	5,610	....
Alizarine Uranol 2B	160	....
Alizarine Viridine FF Paste	5,450	....
Anthosine 3B	100	....
Anthracene Blue SWB Powder	500	....
Anthracene Blue SWGG Ex. Pdr	600	....
Anthracene Blue WB Paste	1,500	....
Anthracene Chromate Brown EB	1,050	....
Anthracyl Chrome Green	440	....
Anthraflavone G Paste	100	....
Anthraflavone GC Paste	2,325	....
Anthraquinone Blue SR Ex. Pdr	10	....
Anthraquinone Green GXNO	10	....
Anthraquinone Violet	20	....
Azo Carmine GX	250	....
Azure Blue BK	200	....
Alizarine Cyanine Green E	100	....
Benzo Brilliant Blue 8G Extra	100	....
Benzo Fast Blue G	100	....
Benzo Fast Blue 4GL	2,850	....
Benzo Fast Bordeaux 6BL	110	....
Benzo Fast Gray	200	....
Benzo Fast Gray BL	100	....
Benzo Fast Heliotrope BL	352	....
Benzo Fast Heliotrope 2RL	115	....
Benzo Fast Orange 2RL	115	....
Benzo Fast Red 8BL	1,030	....
Benzo Pure Yellow 6G Extra	150	....
Benzo Red 12B	1,250	....
Benzo Rhoduline Red B	100	....
Brilliant Acid Blue FF	550	....
Brilliant Azurine 5G	550	....
Brilliant Benzo Fast Helio BL	25	....
Brilliant Benzo Fast Heliotrope 2RL	50	....
Brilliant Benzo Fast Violet BL	235	....
Brilliant Benzo Green B	500	....
Brilliant Benzo Violet B	50	....
Brilliant Benzo Violet 2R	100	....
Brilliant Cresyl Blue BBS	25	....
Brilliant Geranine BBN	400	....
Brilliant Indigo B Paste	600	....
Brilliant Indigo G Paste	400	....
Brilliant Milling Blue B	100	....
Brilliant Rose G	25	....
Brilliant Sky Blue 8G Extra	2,050	....
Brilliant Sky Blue 2RM	5	....
Brilliant Wool Blue FFR Extra	50	....
Capri Blue GON	25	....
Chinoline Yellow Soluble in Spirit	85	....
Chinoline Yellow	2,000	....
Chloramine Brilliant Red 8B	....	100
Chloramine Red B	....	1,000
Chloramine Red 8B	....	3,100
Chloramine Red 8BS	875	....
Chlorantine Fast Blue 2GL	....	2,398
Chlorantine Fast Blue RL	....	1,100
Chlorantine Fast Bordeaux BL	....	660
Chlorantine Fast Bordeaux 2BL	....	1,100
Chlorantine Fast Brown RL	....	660
Chlorantine Fast Red 7BL	....	510
Chlorantine Violet 4BL	....	286
Chlorantine Fast Violet 2RL	....	880
Chlorantine Fast Yellow RL	....	880
Chlorazol Fast Red K (from England 500 lbs.)	....	....
Chrome Azurol S	....	1,000
Chrome Brown TV	....	1,100
Chromaxan Brilliant Blue G	30	....
Chromaxane Violet B	10	....
Ciba Blue 2B Powder	....	420
Ciba Blue 2BD Paste	....	10,890
Ciba Blue G Powder	....	3,040
Ciba Bordeaux B Powder or Paste	....	1,100
Ciba Green G Powder or Paste	....	440
Ciba Orange G Paste	....	1,109
Ciba Red G	....	1,540
Ciba Red R	....	2,695
Ciba Scarlet G Powder	....	220
Ciba Scarlet G Powder 20% Paste	....	3,300
Ciba Violet B Powder	....	484
Ciba Violet B Paste	....	2,640
Ciba Violet R Paste or Powder	....	2,200
Cibanone Blue 3G Paste or Powder	....	2,501
Cibanone Green B Paste	....	330
Cibanone Orange R Paste	....	7,568
Congo Orange G	5	....
Coreine RR Powder	....	50
Cresyl Blue BB	25	....
Cresyl Fast Violet 2B	25	....
Cross Dye Green 2G Conc. (from England 1,350 lbs.)	....	....
Crystal Violet Extra	200	....
Cyananthrol BGAOO	1,848	....
Cyananthrol 3G	300	....
Cyanine B	200	....
Cyanole Extra	600	....
Cyanole FF	2,065	....
Delta Purpurine 5B	940	....
Developer Z	100	....
Diamine Brilliant Scarlet S	672	....
Diamine Catechine B	25	....
Diamine Catechine G	200	....

Designation of Dye	Germany (lbs.)	Switz. (lbs.)
Diamine Catechine 3G	10	....
Diamine Fast Bordeaux 6BS	120	....
Diamine Fast Brown G	220	....
Diamine Fast Orange EG	125	....
Diamine Fast Orange ER	500	....
Diamine Fast Red 8BL	1,300	....
Diamine Heliotrope G	600	....
Diamine Orange G	100	....
Diamine Orange F	50	....
Diamine Scarlet B	1,015	....
Diamine Scarlet B 130%	155	....
Diamine Yellow N 110%	300	....
Diamond Green SS	600	....
Diazanil Pink B	10	....
Diazo Bordeaux 7B	110	....
Diazo Brilliant Black B	500	....
Diazo Brill. Scarlet 2BL Ex. Conc	300	....
Diazo Brilliant Scarlet 6B Extra	600	....
Diazo Brilliant Scarlet G Extra	10	....
Diazo Fast Violet BL	112	....
Diazo Fast Yellow 2G	100	....
Diazo Indigo Blue 4GL Extra	15	....
Diazo Indigo Blue 4GL	10	....
Diazo Indigo Blue 2RL	500	....
Diazo Light Red 7BL	15	....
Diazo Sky Blue B	10	....
Diazo Sky Blue 3G	10	....
Direct Brown 2G	....	1,100
Erika B Extra	1,565	....
Erika GN	50	....
Erio Carmine 2BC	....	1,000
Erio Chrome Azurol BX	....	7,700
Erio Chrome Brown ROS	....	1,500
Erio Chrome Flavine A Conc	....	2,000
Erio Chrome Red B	....	2,000
Erio Chrome Verdon S	....	4,750
Erio Chrome Violet 3B	....	1,000
Euchrysine GRNTN	100	....
Euchrysine RRD	100	....
Fast Bordeaux Benzo 6BL	25	....
Fast Green Extra Bluish	700	....
Fast Mordant Yellow G	10	....
Fastigen B	125	....
Fraise (from France 500 lbs.)	....	....
Geranine B	15	....
Geranine G	200	....
Hansa Yellow G Lumps	500	....
Helindone Blue 3GN Powder	100	....
Helindone Brown G Paste	249	....
Helindone Brown 2R Paste	1,000	....
Helindone Orange R Paste	5	....
Helindone Pink AN	1,403	....
Helindone Pink BN	1,700	....
Helindone Pink R Extra Paste	440	....
Helindone Pink RN	1,000	....
Helindone Red 3B Paste	500	....
Helindone Rose B Extra	25	....
Helindone Violet R Powder	40	....
Helindone Violet R Paste	70	....
Hydron Blue G 20% Paste	510	....
Hydron Blue G	200	....
Hydron Blue R 30% Paste	10	....
Hydron Pink FF Paste	100	....
Indanthrene Black BB Dble. Paste	5,000	....
Indanthrene Blue BCS Powder	710	....
Indanthrene Blue RS Triple Pdr	750	....
Indanthrene Blue RSP Triple Pdr	325	....
Indanthrene Blue WB Powder	20	....
Indanthrene Blue Green B Dbl. Pst.	805	....
Indanthrene Bordeaux B Ex. Paste	1,000	....
Indanthrene Claret B Paste	500	....
Indan. Golden Orange G. Single Pst.	1,100	....
Indan. Golden Orange G Dbl. Pst.	510	....
Indan. Golden Orange G Dbl. Pst. SF	500	....
Indan. Golden Orange RRT Paste	1,956	....
Indan. Golden Orange RRT Dbl. Pst.	2,665	....
Indanthrene Red BN Paste	500	....
Indanthrene Scarlet GS Powder	220	....
Indanthrene Violet B Extra	100	....
Indanthrene Violet RR Ex. Powder.	25	....
Indanthrene Yellow GN Extra	25	....
Janus Red B	200	....
Katigen Green 2G	1,000	....
Lanasol Blue B	....	1,100
Lanasol Brown 2R	....	330
Malta Gray J (from France 1,100 lb.)	....	....
Metachrome Blue Black 2BX	500	....
Milling Yellow O	250	....
Mimoza Z Conc	....	1,000
Naphtha Chrome Azurine B	....	1,210
Naphtha Chrome Violet R	....	220
Naphthamine Blue JEF	250	....
Naphtogene Blue B	1,000	....
New Victoria Blue B	450	....
Nitrosamine Red Paste	3,000	....
Omega Chrome Brown PB	....	1,000
Oxamine Black BBNX	500	....
Oxamine Developer H Conc	500	....
Palatine Black 4BXX	50	....
Palatine Light Yellow RX	10	....
Palatine Yellow RX	10	....
Paper Fast Bordeaux B	3,500	....
Parme Soluble in Alcohol	10	....
Patent Blue AS	....	660
Patent Phosphine G 300%	....	1,100
Patent Phosphine M	....	1,100
Patent Phosphine R	....	110
Phosphine 3R	660	....
Pluto Black A Extra	212	....
Pluto Black G	100	....
Pluto Black G Extra	112	....
Pluto Brown 2G	700	....
Pyrazole Orange G	....	4,440
Pyrogene Cutch GG	....	660
Pyrogene Direct Blue RL	....	3,300
Pyrogene Green 3G	....	2,448

Designation of Dye	(lbs.) Germany	(lbs.) Switz.
Rhodamine 6GDN Extra	225	....
Rhodamine 6GH Single	....	660
Rhodamine 6HG	....	55
Rhoduline Red Benzo B	100	....
Rosanthrene B	....	1,100
Rosanthrene Bordeaux B	....	180
Rosanthrene Orange R	....	121
Roselane Paste (from France 25 lbs.)	....	....
Rosinduline GFX	225	....
Royal Blue No. 1048K	1,000	....
Sambesi Black F	500	....
Sericose L (Developer)	10	....
Setocyanine	....	1,500
Silk Blue BT5BOO	506	....
Sulphon Orange G	20	....
Sulphur Brown CL4R	5	....
Sulphur Brown CLG	25	....
Sulphur Corinth CLB	5	....
Supramine Black BR	250	....
Supramine Brown R	250	....
Supramine Yellow R	100	....
Thioflavine TCN	20	....
Thioflavine T	188	....
Thiogene New Blue 2RL Ex. Conc.	37	....
Thiogene New Blue 2RL	44	....
Thio Indigo Rose RN Extra Paste	10	....
Thio Indigo Scarlet G Paste	110	....
Thio Indigo Scarlet 2G Paste	10	....
Thional Brilliant Green GG	....	700
Toluylene Red	1,100	....
Triazol Red B	....	1,100
Trisulphon Brown B	....	6,000
Trisulphon Brown GG	....	2,500
Trisulphon Brown GG Conc	....	2,000
Ursol SA	56	....
Ursol SB	56	....
Vat Pink B Extra	100	....
Vat Pink R Extra	100	....
Victoria Blue BO Pure	542	....
Wool Fast Blue BL	858	....
Wool Fast Blue GL	550	....
Xylene Cyanol FF Extra	....	1,200
Zambesi Pure Blue 4B	50	....
Carmine 1763H	10	....
Madder Lake No. 70 Extra	40	....
Permanent Red No. 744H	100	....
Permanent Violet No. 33	50	....
Permanent Violet No. 2836Z	50	....
Fast Violet Lake F1170	100	....
Viridin Green	210	....

Totals:	
Germany	134,784
England	3,650
France	1,625
Switzerland	114,556
Grand Total	254,615

LICENSE REQUIREMENTS FOR IMPORTATION OF SYNTHETIC ORGANICS

So much annoyance, and delay sometimes arises from the importation of synthetic organics without first securing a license to import, that J. A. Hynes, a chemist in the U. S. Custom Service, believes it opportune to set forth briefly, for the benefit of the trade in general, the requirements for the importation of these products.

For a considerable period there has been required a license to import "Coal Tar Derivatives," and this requirement was pretty well understood by importers who applied to the War Trade Board for their licenses. With the advent of the Emergency Tariff Act (effective May 27, 1921) the license requirement was extended to cover "Synthetic Organic Chemicals" (with certain exceptions) and the authority to grant license transferred from the War Trade Board to the Secretary of the Treasury —which brings the details within the scope of the Collector of Customs. On July 21, 1921, the Assistant Secretary of the Treasury issued under Treasury Decision 38799 instructions for the guidance of appraisers and collectors. It is possible to give here only such an outline of this decision as will call the attention of importers —actual or prospective—to the necessity of a license. Details may be obtained from the decision itself or by applying to the Collector of Customs, or to any Custom House broker.

1. The terms "synthetic organic chemical and synthetic organic drug" . . . are interpreted to apply to any substance which is known commercially as a chemical or drug and which *contains carbon in chemical combination with other elements* (excepting cyanides, cyanamides, carbides, carbonates, and bicarbonates of the metals or inorganic radicals) and which has been produced by any chemical process other than that necessary to extract, isolate, or purify the substances from a natural source or effect its separation from a more complex natural compound by hydrolysis or to form a salt.

2. Products obtained by fermentation if such fermentation is carried on under controlled conditions, are considered to be synthetic organic chemicals. . . . Fractional distillation of natural substances does not make a synthetic chemical . . . destructive distillation does.

2. . . . .

4. In cases where substance may be either natural or synthetic . . . it is assumed to be synthetic if it is known that the substance is of a substantial commercial quantity.

5. . . . if the product is obtained both synetheically and otherwise, an affidavit of the manufacturer stating clearly the process of manufacture of the product may be submitted with the invoice by the importer.

6. . . . mixtures in part of coal-tar origin . . . considdered same as if wholly coal-tar origin.

7. . . .

8. It is held that the wording of the act includes natural dyes and dyestuffs.

In a later decision (1. D. 38806) there is submitted a list of Synthetic Organics and "Not Synthetic Organics." This may serve as a guide to importers. The synthetics

include formic, lactic, oxalic, pyrogallic, acetic, valerianic acids, and all salts of these acids; acetic anhydride, acetone, acetone oil, formaldehyde, chloral hydrate, urea, dionin, terpin hydrate, carbon tetrachloride, chloroform, cellulose esters, amyl acetate and nitrite, ethyl acetate and chloride, sulphuric ether butyl alcohol, iodoform, heroin, peronin, calcium, cacodylate, mercury cacodylate, etc. The "Not Synthetic" lists includes citric, gallic, tannic, tartaric, prussic, glycerophosphoric acids, and all metallic or inorganic radical salts of these acids; thymol, glycerine, sulphocyanides of metals, cocaine, morphine, menthol, and bismuth albuminate. The foregoing are merely representative exhibits. The chemist will know at once from the definition given under No. 1, whether a license will be required or not.

Apply to the Collector of Customs at the nearest port for appropriate application and directions for filing same (in Chicago, apply at the fourth floor, south wing of Federal Building).

It is advisable to obtain a license before placing an order. Otherwise one may find when the merchandise arrives that a license will not be granted—with resulting embarrassment and loss.

ALLIED CHEMICAL AND DYE CORP. EARNS $2.27 ON COMMON SHARES

Net Income for 1921 Amounts to $7,646,909 — Bank Indebtedness Entirely Liquidated

Allied Chemical & Dye Corporation, for 1921, shows, after deducting all charges, including taxes, a net income of $7,646,909, equivalent to $2.27 a share on the outstanding 2,169,439 common shares, after allowing for preferred dividends.

Gross income of the corporation and subsidiaries amounted to $13,093,889. Reduction of inventories to cost or market, whichever was lower, as of December 31, last, caused a reduction in income of $3,940,557, while the loss resulting from sale of securities brought about a further decrease of $773,413, a total of $4,713,970, and creating a net income prior to Federal taxes of $8,379,918. Taxes amounted to $733,009.

Dividends paid during the year aggregated $11,356,834, consisting of $2,706,107 preferred and $8,650,727 for the common, thus creating a final deficit for the year of $3,609,905. This caused a drop in the total surplus as of the close of last year, to $122,659,080, which compared with $126,369,005 on December 31, 1920.

William H. Nichols, chairman of the board, in his report to stockholders, calls particular attention to the strength of the company's current financial position. The bank indebtedness of $11,100,000 outstanding at the close of 1914, was completely liquidated during 1921, so that at the end of the year the company had no current indebtedness beyond trade accounts, accrued wages and declared dividends.

The balance sheet discloses an excellent position. Cash holdings substantially exceed the aggregate of current liabilities. Total current assets at the close of the year were $74,711,560, inclusive of $11,931,284 cash, while current liabilities totaled only $8,285,909, leaving a net working capital of $66,425,651.

Mr. Nichols' report adds:

As anticipated, the serious depression of business in general during 1921 caused a corresponding reduction in the volume of this company's business during the year, which is reflected in the earnings. There has been, however, a gratifying increase in the demand for the company's products, coincident with the recent improvement of business in general.

In determining net income for 1921, as for 1920, inventories at the end of the year have been reduced to cost or market value, whichever was lower, and ample provision has been made for depreciation, as evidenced by the increase in the depreciation reserve. The item of organization expense was also charged against the year's operations.

Particular attention is called to the strength of the company's current financial position. The bank indebtedness of $11,100,000 at December 31, 1920, was completely liquidated during 1921, so that at the end of the year the company had no current indebtedness beyond trade accounts, accrued wages and declared dividends.

It will be noted that most of the $4,638,940.67 minority stockholders' interests outstanding at December 31, 1920, were acquired during 1921, leaving $1,200,994.82 outstanding at the end of the year—approximately one-half of one per cent. The company did not issue any additional stock during the year except for acquisition of additional stock of subsidiary companies.

The company's most conspicuous technical development during the year was to establish successfully, on an industrial scale, the manufacture of anhydrous ammonia directly from the nitrogen of the air. The company's new plant for this purpose has been running steadily at capacity since it was completed last fall and is the first of its kind to be successfully operated in this country.

The Velvet Textile Corporation, 140 Market Street, Paterson, N. J., has recently incorporated to provide mortgage, lease, sell, and in all ways use and operate factories and machinery for the manufacture and sale of velvets and plushes, and all other kinds of fabrics. The total stock is $200,000, two thousand shares of $100 par value. The shareholders are Clifford L. Newman, Julia V. Many and Ethel Carnathian.

DECLARES RUSSIAN TEXTILE INDUSTRY IS PRACTICALLY WIPED OUT BY SOVIET RULE

The disorganization of Russian industry caused by Communist experiments has affected all the branches of the textile industry very seriously, according to Charles Goodlet, in the "Textile Manufacturer." The present condition of the textile industry is such that, strictly speaking, the industry can hardly be said to be working at all. Only 0.7 per cent of the spindles in the mills are in operation.

The first few months of 1921 showed a certain improvement in the situation as compared with 1920, but since April the production of all textile factories has declined rapidly, and by the beginning of last summer the output fell below the figure for the corresponding period of 1920.

The principal cause of the small output of all branches of the textile industry is the lack of fuel. The fuel crisis in Soviet Russia was very acute at the beginning of this year, as the reserves of all kinds of fuel which had been accumulated before the advent of the Bolsheviks were exhausted. The shortage of fuel affected all industries. According to the "Ekonomicheskaia Zhizn" (April 23), the effect on the textile industry was as follows: The shortage of fuel resulted in the closure of 77 per cent of the cotton mills, 69 per cent of the flax mills, 53 per cent of the silk mills, and 70 per cent of the woolen mills. The shortage was a consequence of the whole economic system of the Soviets. Owing to the insufficient wages offered, the Bolsheviks were unable to find a sufficient number of workmen even for the simple task of hauling timber from the forests.

Apart from the lack of fuel, the textile industry was greatly embarrassed by the shortage of labor. By the beginning of 1921 there were already four vacancies in the the textile mills for one workman seeking employment. At the present time, when the number of mills in operation has decreased from four to six times as compared with the beginning of this year, this shortage of labor may not be felt. There is no real work at the factories. It is impossible to open all the textile mills, because there would not be enough operatives for all. The shortage of mill hands is due to the same cause as the absence of workmen in the fuel industry—*i. e.*, the inadequacy of the wages offered as compared with the cost of living.

The two factors above mentioned are the fundamental causes of the paralysis of the Russian textile industry, nationalized by the Soviet Government. Moreover, they are the direct consequence of the very construction of the Soviet system, and cannot be removed without radically altering the system. For the first seven months of 1921 the results were as follows:

Cotton Industry.—Out of a total of 7,000,000 spindles in Soviet Russia, only 900,000 spindles (in thirty-six mills) were at work during the first three months of 1921. In April, May and June there was a great decrease in the number of spindles, and in July it fell to 48,033, which forms 9.2 per cent of the number of spindles it was proposed to use, and 0.7 per cent of the total number at the disposal of the Bolsheviks. During the first half of July only twelve cotton mills were working, and in the second half of that month only six (out of a total of 90). From private information it appears that by the beginning of autumn only the Tver Coton Mills were working.

The present territory of Russia contains about 200,000 weaving looms, of which approximately 25,000 were working at the beginning of 1921, but during the second quarter of the year there was an abrupt decline, the number of looms working in July being only 1570, or 11.4 per cent of the number it had been proposed to use.

Of course, even prior to the catastrophic decline of production the output of cottons at the Soviet factories did not satisfy even one-tenth of the requirements of the population. Before the Revolution the Russian factories now in the hands of the Bolsheviks used to produce more than 2,000,000,000 arshins of cotton textiles; now the output will hardly reach 150,000,000 arshins.

Woolen Industry.—No better results have been obtained at the woolen mills It was proposed to produce 37,000,000 arshins of woolens in the course of the year, but, according to the report read at the Textile Congress, for the first six months the output of primary textiles was 7,200,000 arshins. According to the program, eighty-seven mills, with 192,000 spindles, were to have been working. By April, however, sixty-one mills had to close down for lack of fuel. Then the number of mills still working was further reduced—viz., to sixteen in the first half of July, and to four in the second half, with 13,510 working spindles.

For the first half of 1921 the total output was about 25 per cent of the pre-war figure. Every month, however, the output of the woolen mills kept decreasing, and in July it was less than 5 per cent of the pre-war monthly average. The woolen mills are likewise very short of raw material. Next year there will be no more wool.

The catastrophic decline in the production of the factories throws the question of raw material into the background. If the output does not exceed the figure for July the present stocks of wool will last for a long time.

Flax Mills.—The output for the first half of 1921 was less than that for the same period of 1920. Owing to lack of fuel in April only eighteen out of sixty-six flax mills were working, and subsequently, in July, the number decreased to two.

The silk and hemp mills are in no better condition. In July, out of a total of forty-five silk mills, only two were working, with an aggregate of thirty-six looms (the total number of looms in the silk mills is over 8,500).

Seven of the seventeen hemp mills were closed down in April for want of fuel.

Such is the condition of the Russian textile industry. Only the restoration of normal economic conditions—under which the workers would be interested in obtaining employment, and the employers in successful production—could bring new life into the textile and all other Russian industries. The Bolsheviks are fully aware of this. They have already offered to lease industrial undertak-

ings to the former owners. So far, there has been practically no response. A great deal of money would be required for repairs. Will anyone be found foolish enough to invest money in a country whose Government does not acknowledge private property, and where there is a minimum of law and order, and where the power of life and death over everyone is vested in extraordinary commissions composed of the most shady elements of the community?

DU PONT ANNOUNCES PONTACYL SULPHON BLUE R, PONTACHROME BROWN G AND PONTAMINE SCARLET B

There have been recent additions to the line of colors as offered by E. I. du Pont de Nemours & Co., and these are represented in Pontacyl Sulphon Blue R, an acid blue that is greatly in demand by the woolen trade for producing of Navies, and used because of its very desirable brightness of shade, and excellent solubility.

An addition has been made to their chrome line by adding Pontachrome Brown G. With this new color, it makes their Brown range very complete, giving the consumer almost any of the shades from the yellowest to the reddest.

To their line of Fast Cotton Reds has been added Pontamine Scarlet B, a product characterized by excellent solubility and level dyeing properties. This makes it very adaptable for use in light salmon shades; and can be very readily discharged on both cotton and silk, giving a clear white. When dyed in union work it leaves wool white.

DYE PRODUCTS & CHEMICAL COMPANY ADOPTS BRAND NAME "DYELENE"

The Dye Products & Chemical Company, Inc., will, in the future, according to an announcement, put out all their products under the brand name "Dyelene." The company manufactures various dyes and intermediates and will continue to maintain the high standard of quality and dependability under the brand "Dyelene," as in the past.

The various dyes and intermediates now manufactured by the company are as follows:

Dyelene Fast Acid Green, Dyelene Naphthol Green B, Dyelene Ponceau 3RB, Dyelene Chrome Red, Dyelene Cloth Scarlet G, Dyelene Metanil Yellow, Dyelene Azo Yellow, Dyelene Fast Acid Yellow G and Dyelene Bismark Brown R; Intermediates: Dyelene M T. D. (Meta Toluylene Diamine), and Dyelene Developers.

The company has several additional colors in preparation and intends to put these on the market in the very near future.

The Wetterwald & Pfister Company, Inc., New York, has been incorporated for manufacturing dyestuffs, intermediates, etc Incorporators are: Jacob Pfister, Roselle Park, N. J.; Rose Pfister, Roselle Park, N. J., and R. H. Funke, 622 West Forty-first Street, New York.

The dye committee of the Technical Association of the Pulp and Paper Industry has practically completed the compilation of a book on dyes in the paper industry soon to be published by the association.

An increase in surplus of $1,159,525 for the year 1921, as compared to 1920, is shown in the annual report of the Pacific Mills.

The Pacific Color Company's plant at Chilliwack, B. C., has turned out its first consignment of mineral colors. The plant which has a capacity of three tons of dry dye color per day is the second to be established in America to utilize a German method of preparing mineral dyes and colors. The raw material used is lead ore from Field and subsidiary ingredients from the Bunson Lake district of British Columbia.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, OF THE AMERICAN DYESTUFF REPORTER.

Published biweekly at New York, N. Y., for April 1, 1922.

State of New York, County of New York, ss.: Before me, a notary public in and for the State and county aforesaid, personally appeared Alfred P. Howes, who, having been duly sworn according to law, deposes and says that he is the publisher of the American Dyestuff Reporter and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor and business managers are:

Publisher—Alfred P. Howes, 4109 Woolworth Building, New York City. Editor—Louis A. Olney, Lowell, Mass. Managing Editor—Laurance T. Clark, 4109 Woolworth Building, New York City. Business Manager—Alfred F. Howes, 4109 Woolworth Building, New York City.

2. That the owners are: Howes Publishing Co., Inc., 4109 Woolworth Building, New York City (Alfred P. Howes, 4109 Woolworth Building, New York City; Mary K. Howes, Northampton, Mass.; William F. Collins, Upper Montclair, N. J.); Louis A. Olney, Lowell, Mass.; Derfla H. Collins, Upper Montclair, N. J.; N. H. Hiller, Carbondale, Pa.; Joseph L. Schroeder, Hartsdale, N. Y.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

A. P. Howes, Publisher.

Sworn to and subscribed before me this 16th day of March, 1922.

[Seal] Edw. E. Vincent.

(My commission expires March 30, 1922.)